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# THE METAL INDUSTRY

WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER
ELECTRO-PLATERS REVIEW

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A MONTHLY JOURNAL RELATING TO THE METAL AND PLATING TRADES

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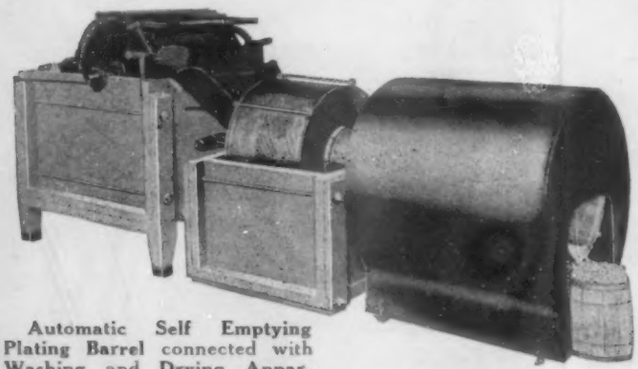

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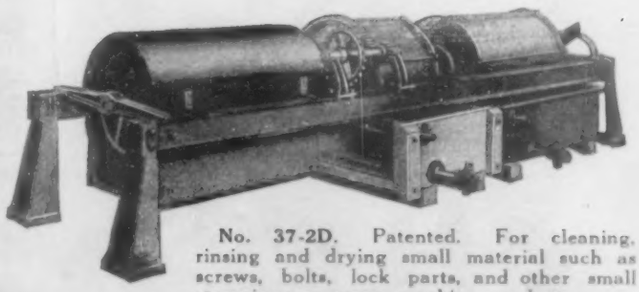

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THE METAL INDUSTRY
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THE ALUMINUM WORLD, COPPER AND BRASS, THE BRASS FOUNDER AND FINISHER AND
ELECTRO-PLATERS REVIEW

Vol. 18 NEW YORK, JULY, 1920 No. 7

# American Electroplaters' Society

## Eighth Annual Convention Held at the Seneca Hotel, Rochester, N. Y., July 1-3, 1920

**Written for The Metal Industry by GARDNER B. ELLIS**

S. P. GARTLAND,
Supreme President.

Rochester, during the first three days of July, was the seat of the eighth annual convention of the American Electro-Platers' Society. It was a remarkably interesting and instructive convention, considered by the visiting delegates to have been one of the most successful and most enjoyable in the history of the society. The convention was held in the Rose Room on the second floor of Hotel Seneca, where the 300 odd delegates from the nineteen unit bodies, representing a membership of more than 850, gathered and listened to tales of experience, practical demonstrations of value and discussions calculated to broaden and improve the scope and importance of the electro-plating industry.

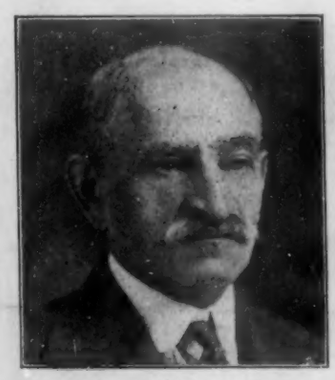
The delegates began to reach the city on the night of June 29, and on Wednesday, June 30, the visitors and members of their families and friends had the pleasure of renewing acquaintances. In the afternoon they took advantage of the wonderful weather and made many trips to some of the remarkable manufacturing plants that have placed Rochester on the industrial map of America. Of course the electro-plating shops were the main features shown.

The groups were arranged as follows:

Eastman Kodak Company — Camera parts, showing nickel and black nickel plating. Party conducted by Mr. Dorring.

Hawkeye Plant, Eastman Kodak Company — Camera accessories. Party conducted by Mr. Groh.

Taylor Instrument Company — Dials, scales and finishes. Party conducted by Mr. Gartland.



PHILIP UHL,
National 1st Vice-President.

Railway Signal Company — Copper, nickel and zinc plating, sand blasting. Party conducted by Mr. E. E. Fitch.

Rochester Stamping Works—Hollow-ware. Party conducted by Mr. Jordan.

Van Bergh Silver Plating Company — Hollow-ware, plated with silver or nickel. Party conducted by T. F. Jordan and G. Hesselink.

North East Electric Company—Electric automobile equipment, zinc plating and japanning. Party conducted by Mr. Lopez.

W. B. ALLEN,
National 2nd Vice-President.

In the evening there was a trip by trolley to Sea Breeze on Lake Ontario and historic Irondequoit Bay, one of Rochester's summer resorts, eight miles north of the city.

### THURSDAY, JULY 1

The convention proper began on the morning of July 1, with practically every delegate in his chair. The assemblage was formally called to order by Supreme President Oscar E. Servis, of Chicago. George H. Hesselink, president of the Rochester Branch, delivered an address of welcome to Rochester on behalf of the Rochester platers and introduced Charles C. Beahan, former president of the Rochester Chamber of Commerce, who, in the absence of President Jeremiah G. Hickey, extended the freedom of the city to delegates and their friends. Mr. Beahan said and that since the city was taking such a prominent position in the great

JOHN E. STERLING,
National Secretary.

industrial world it was eminently fitting that the Electro-Platers should favor Rochester with their presence. Sylvester B. Gartland, secretary and treasurer of the Rochester Branch, replied.

Dr. W. Blum, of the Bureau of Standards, of Washington, D. C., was the principal speaker of the morning session. He discussed, among other matters, the necessity for Electro-Platers to delve more deeply into experimental work along certain lines where the art is still far from developed, and outlined certain plans to be followed during the coming year. Other speakers were Walter Fraine, of Dayton, O., past president, and H. H. Williams, of St. Louis, Editor of the Monthly Review; Charles H. Proctor, founder of the society; G. B. Hogaboom, and W. S. Barrows, both past presidents, and Hedley J. Richards, formerly editor of the Monthly Review.

In the afternoon technical papers were read by H. F. Speary, of the Rochester Branch, who talked on "Anode-Hook Connections and Their Protection"; Henry Weisner, of Wheeling, W. Va., on "Nickel Plating Sheet Zinc Articles"; Dr. Blum, who delivered his second address of the day on "Notes on Hydrofluoric Acid in Nickel-Plating Solutions."

The evening session found the delegates and visitors in a special session to listen to the reading of technical papers. G. A. Wilson, of the New York branch, read a paper on "Sanitation," which directed particular attention to the cleanliness of polishing and plating departments. This was followed by Elmer W. Woodmansee, of the Detroit Branch, who treated experiments and comments on the addition of hydrofluoric acid to make solutions. Mr. Marsden, of New York, followed with a contribution on the "Production of Malleable Nickel."

### FRIDAY, JULY 2

The delegates and guests journeyed by car to the Genesee docks at Charlotte, now a part of the city of Rochester, where at 8:30 o'clock that morning the platers boarded the Steam Barge Ontario I for Coburg, Ont. An orchestra accompanied the visitors, who danced, both going and returning.

ONE END OF THE ASSEMBLAGE.

Business sessions were held on the boat, at which action was taken on several proposed amendments to the constitution of the Society. An amendment to include assistant platers to the organization was defeated by a very narrow margin. It was voted that the dues of the Society be raised in order to take care of the increased maintenance expense. Several additions to the by-laws, improving the service of the Society to members, and increasing the scope of the organization in general were acted upon favorably.

During the business sessions two technical papers were read. One was by R. J. Hazucha, on "Ball Bearings." The other, read by F. J. Hanlon, was entitled "The Oxidation of Aluminum."

Three hours were spent at Coburg. The party went direct to the Arlington hotel, where lunch was served. After lunch a baseball game was played between representatives of the East and West. R. J. Hazucha captained the Western artists, while Harry Flanigan guided the Eastern contingent. The Westerners won by a score of 17 to 6.

On the trip back across Lake Ontario another business session was held. Oscar E. Servis, of Chicago, supreme president, gave a report, as did John E. Sterling, supreme secretary, and H. H. Williams, of St. Louis. The party arrived at the Genesee docks at 10 o'clock and were conveyed to the city (uptown) by special train.

SATURDAY, JULY 3

Saturday morning's session was confined principally to the work of selecting the convention city for 1921 and the annual election of national officers. The matter brought up on Friday, relative to the admission of assistant foremen platers to membership in the Society, was again taken up for consideration. It was finally decided to leave its solution to a referendum vote of the entire Society to be acted upon within six months.

Several cities asked for the annual convention of 1921. After hearing their claims the delegates voted to convene next year at Indianapolis.

A committee of Research and Standardization was named as follows: Walter Fraine, Dayton, O., chair-

THE CENTER OF THE GATHERING.

man; John E. Sterling, of New York; E. Lovering, of Detroit; S. Hedden, of Pittsburgh; and H. H. Williams, of St. Louis.

Officers were elected as follows: Supreme President, Sylvester P. Gartland, of Rochester; first vice-president, Philip Uhl, of Philadelphia; second vice-president, Walter B. Allen, of Grand Rapids; secretary-treasurer, John E. Sterling, of New York; editor, H. H. Williams, of St. Louis. Oscar E. Servis, of Chicago, past supreme president became a member of the Executive Board.

An elaborate program of entertainment was provided under the supervision of Elroy Miller, a local entertainer. Motion picture scenes of the various high lights of the convention were put on by the Movette Corporation and proved to be a happy feature for a most enjoyable ending.

## Side Lights on the Ball Game

By H. J. RICHARDS, St. Louis, Mo.

Oh listen to me, platers, and give me your attention,
I'll tell you of the ball game at the Rochester Convention.
It was in the town of Coburg, in nearby Ontario,
A place that we shall ne'er forget, wherever we may go.
'Twas there the Eastern ball team, although they did their best,
Were flattened out completely by the Wild and Woolly West.
The East had some good players but they didn't have enough,
So Hazucha's bunch ran over them, and treated them quite rough.
In vain their pitcher Hutchins used a windup tantalizing,
Arrayed in shirt of brightest pink, a color scandalizing.
He was hammered like Tom Trumbour, the well-known Platers' Friend,
Who was knocked out while the game was young—his benders wouldn't bend.
J. Miller was the Umpire and the West said he was good,

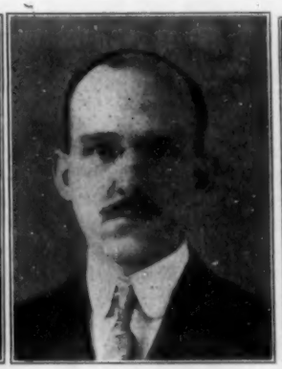
THE OTHER END OF THE CONVENED PLATERS.

But the Easterners all told him that his eyes were made of wood.
The balls came Slattery's way so fast, he'd stop them not at all,
But the Eastern catcher Jugel played a snappy game of ball.
Bill Schneider rooted in four runs and tried all kinds of tricks,
But the final score against the East was seventeen to six.
Magic Fluid played on second, Flannigan kept score,
Hazucha pitched to Laurence, and they made the rooters roar.
Next year I'm sure the East will try again and play their best,
But they'll only get licked worse because those guys from 'way out West
Are bound to win at any game wherever they may roam,
For when those fellows travel they leave all their goats at home.

# What the Past Presidents Thought of the Convention

C. H. PROCTOR.

H. H. WILLIAMS.



G. B. HOGABOOM.

WALTER FRAINE.

The Eighth Annual Convention was very successful, and great credit is due to the members of the Rochester Branch for the way they have carried the convention to a successful termination. The entertainments were unexcelled by any previous convention, and it appeared that every one who attended was thoroughly satisfied. The papers were quite numerous and of a very high standard. The discussions were very interesting and of great benefit to those who were in attendance.

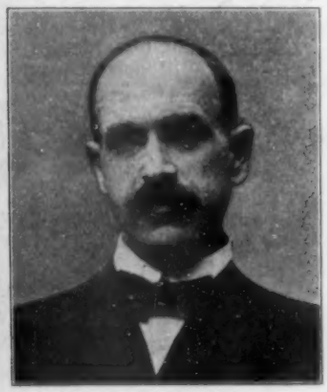
CHAS. H. PROCTOR.

The four day convention just closed has been an unusual one in that it has proven that the smaller and average size branches can entertain the Supreme Society with great credit to both. While the educational features in the number of papers presented was not as large as usual many valuable discussions enlivened the sessions devoted to that feature. The value of the Monthly Review to the members was manifested by the action to increase its revenue without a single protest.

H. H. WILLIAMS.

Each succeeding convention emphasizes the great work that the A.E.S. is accomplishing. The frank fellowship and exchange of knowledge were never so evident as at Rochester. The keynote seemed to be "Give and Take."

OSCAR E. SERVIS.



W. S. BARROWS.

Last year a step forward was made when the papers presented before the society were released to all publications. This year it was hoped that another step would be made in the right direction and the assistant foreman be recognized, but unfortunately this did not meet with the approval of the necessary majority. The vote was so close, however, that it is clearly indicated that each year some advancement is made and it is predicted that it will not be long before we shall be able to welcome our able associates in the society.

G. B. HOGABOOM.

The convention just closed has been a most successful one from an educational standpoint, and the progressive ideas brought out will help toward making progress in the industry. Good fellowship was evident among those attending and the arrangements for the comfort of the delegates and visitors were splendidly taken care of. The convention was easily on a par with previous ones, closing a most successful year.

WALTER FRAINE.

The Rochester Convention is one that will long be remembered by all those who attended. The entertainment and educational programs were very interesting and great credit is due to the members of the Rochester Branch. Canada was liberally represented, and next year we hope to do even better, especially if we are successful in organizing branches in Montreal and Hamilton.

W. S. BARROWS.

As a charter member and Past President of the A. E. S. I can say that the Rochester Convention is one of the best that I have attended; the society is making good progress. It is a great pleasure to attend our conventions, to renew old acquaintances and enjoy the entertainment and educational features.

R. H. SLITER.

## MEETING OF PAST PRESIDENTS

On Saturday, July 3rd, George B. Hogaboom, past supreme president, tendered a dinner to all of the past presidents of the A. E. S. An informal association will be formed for the purpose of keeping together those who have directed the affairs of the Society. There will be memories kept and ties formed that will be invaluable both to the past presidents and the Society as a whole.

# Nickel Plating Rolled Zinc

## A Description of Some Methods in Use, as Recommended by The New Jersey Zinc Company

Users of rolled zinc frequently desire to nickel plate either the original strips and sheets or the articles made therefrom. Nickel plating on zinc is readily accomplished as may be evidenced by the fact that this process is in regular operation in a number of large and successful manufacturing plants.

In some cases, however, difficulty has been experienced in obtaining adherent deposits and good color, and it is doubtless true that the plater who has had no experience in plating on zinc is likely to obtain streaky, non-adherent deposits. The purpose of this article is to explain the causes of these difficulties and to point out the remedies.

The essential requirement for the production of adherent deposits is that the surface to be plated be absolutely clean. Zinc is readily attacked by strong solutions of alkalis such as caustic soda with the attendant formation of various compounds on the surface of the zinc. Even such a mild alkali as soda ash (sodium carbonate) reacts under certain conditions with the zinc to form a thin surface film of basic carbonate. If it is attempted to clean the zinc in solutions containing much alkali or if the action of cleaners composed essentially of sodium carbonate is not carefully watched and controlled, the deposit of nickel will be separated from the zinc by a thin, imperceptible layer of these basic compounds. Such a deposit will inevitably appear no matter how good the deposit may be.

An alkali of some sort is necessary properly to remove the grease and oil left on the surface from the bottom operations. A cleaner composed of sodium carbonate with only a small amount of caustic soda may be successfully used if care is taken that the zinc is left in the solution no longer than is necessary to remove the grease. There is always the tendency toward the formation of a surface film with the resulting peeling when using this type of cleaner, and it is desirable to avoid this danger. If zinc is used as the cathode in an electric cleaner, the evolution of hydrogen gas at the surface of the zinc effectively prevents the formation of an interfering film of basic compound. Moveover, the formation of bubbles assists in a mechanical way in the emulsification of the oil or grease in the alkali solution.

For these reasons, The New Jersey Zinc Company recommend the use of an electric cleaner with zinc as the cathode for cleaning zinc preparatory to plating of any kind. A solution containing four ounces of sodium carbonate per gallon gives good results.

After the zinc has remained in the cleaner the necessary length of time, it should be removed from the bath, rinsed in clean water, and placed in the plating tank without delay. The surface of the zinc should not be allowed to become dry as slight oxidation would result and this in turn would cause a non-adherent coating. At this stage of the operation the thoroughness of the cleaning may be judged; if the rinsing water covers the entire surface when removed momentarily the surface is properly cleaned, but if there is a tendency for the water to collect in drops or streaks instead of remaining in an even sheet over the surface the cleaning has not been carried on long enough.

Nickel may be deposited upon zinc by simply immersing the zinc article in a nickel solution, but such a deposit is always black and non-adherent. When depositing nickel electrolytically the same difficulty is experienced at low current densities. By raising the current density, however, a rate of deposition can be found at which the deposit will adhere to the metal. This is true of even a plain nickel sulphate solution, but if only nickel sulphate is used the deposit will not be of good color. In order to obtain a good color boric acid is added, and solutions containing only these two constituents give very good results in actual practice. For example, for plating on zinc one large manufacturer uses very successfully a solution containing 12 ounces of single nickel sulphate and three ounces of boric acid per gallon and nothing else.

Such a solution has rather narrow working limits and, in the case of articles having deep recesses streaky deposits might result. This can be overcome to a large extent by the addition of sodium citrate, and increasing the concentration of the nickel salt in the solution will also be an advantage. The use of a small amount of nickel chloride is also advisable to insure good anode corrosion.

For general use in directly nickel plating zinc articles the following solution will give excellent results:

| | |
|---|---|
| Nickel sulphate | 32 ounces |
| Nickel chloride | 2 ounces |
| Boric acid | 4 ounces |
| Sodium citrate | 22 ounces |
| Water | 1 gallon |

This solution may be operated at very high current densities and thus aid in speeding up production. It will give equally good results at lower densities. For general purposes a current density of between 10 and 30 amperes per square foot will be found very satisfactory.

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### Spotting-Out

Many are having trouble with old problems of spotting-out which starts to develope in June, especially if the weather is damp and humid. Brass and copper plates are both susceptable to spotting-out because they are readily oxidized by the plating solutions remaining in the pores of the base metal. These pores appear to fill up with moisture, combine with the plating salts and overflow, giving dark spots under the lacquer. Silver and nickel are not so readily acted upon.

If the brass solution produces a good color at the time a little more free cyanide can be added which will assist matters somewhat. Add from ½ to 1 ounce of sodium cyanide per gallon of solution. This will clean up the anodes. Of not, add at intervals 1/16 ounce of caustic soda per gallon until the anodes do stay clean when the brass solution is not working.

Be careful not to add an excess of caustic soda or the zinc will predominate in the brass deposit. Following these instructions carry out the washing manipulations as before. Add from 1 to 2 ounces of cream of tartar per gallon to your hot or boiling water which should be kept especially for the purpose of washing. Start by adding the 1 ounce first. Immerse the article in this boiling water for a few minutes then re-wash in clean boiling water and then dry out at a temperature of 212 degrees Fahr. for a short time in order to dry up any moisture in the pores of the metal.

If these instructions are followed carefully they will overcome the spotting-out trouble—C. H. P.

# Alkalinity or Acidity of a Nickel Solution*

By J. C. KRETCHMER

This subject is acidity or perhaps more correctly speaking, alkalinity of nickel plating solution, and the following is considered a control rather than actual analysis. It is assumed that anyone desiring to use this method has at least the rudiments of chemistry. This is not necessary, but would give the operator better understanding of the apparatus and chemicals.

The apparatus is simple and of few pieces. The following are the most necessary: balance, 1,000 c.c. flask, 25 c.c. burette, 25 c.c. crucible, 25 c.c. beaker, glass stirring rod and 10 c.c. pipette.

The chemicals consist of $H_2SO_4$ and $Na_2CO_3$, and these must be C.P. An indicator is also necessary, which gives the end point, or tells the operator when he has added enough of one chemical to the other, by changing color. There are many indicators and the one used is a matter of choice. Methyl orange was used by the writer and it is red with acids and yellow with alkalies. A solution of this indicator is made by dissolving about 2 grams of methyl orange in 1,000 c.c. of distilled $H_2O$.

Two standard N/28.17 titrating solutions are required, one $H_2SO_4$ solution containing 13.81 grams per liter and the other $Na_2CO_3$ containing 14.937 grams per liter.

Directions are given for 1 liter, but any amount may be made up, so long as the proportions are kept the same. The $Na_2CO_3$ solution may be made up to .1 liter, and great care must be taken with this solution, as the $H_2SO_4$ is standardized by it.

Real acid cannot be determined by this method, but a nickel solution can be controlled very nicely. If a nickel solution is so acid as to form a red solution with methyl orange it would be too acid to work well. Different grades of work or metal require more or less alkali, or acid, and this must be determined by experience.

The nickel solution should always be neutral or slightly alkaline and should be of a yellow color with methyl-orange. A new solution made from double salts will require about .3 c.c. of the standard solution to change the color from yellow to red. This change of color is the end point.

Now let us call .3 c.c. the neutral point; then the first three .1 c.c. marks will be for acid and the balance for alkali. If on a 10 c.c. sample of nickel solution 3 c.c. of the standard solution had been used, this would be called the neutral point. If .2 c.c. had been used, the solution would be called 1 point acid. If .1 c.c. had been used, the solution would be called 2 points acid. If the solution were yellow in color and the first drop of test solution changed the color to red, the solution would be called 3 point acid.

Now, then, if .4 c.c. had been used, the solution would be called 1 point alkali. If .5 c.c. had been used, the solution would be called 2 points alkali; each .1 c.c. used after the first three counts for a point alkali.

Three fluid oz. of 26 degree $NH_4OH$ are required to neutralize one fluid oz. of 66 degree Baume $H_2SO_4$.

If it is desired to have the solution 1 point acid and it tested 3 points alkali, the solution would require 4 x .01 fluid oz. $H_2SO_4$ per gallon. On the other hand, if the solution tested 2 points acid and it is desired to have the solution 3 points alkali, the solution would require 5 x .03 fluid oz. $NH_4OH$ per gallon.

If the solution is too acid add $NH_4OH$; if too alkaline add $H_2SO_4$. For each point of undesirable alkali add .01 oz. $H_2SO_4$ per gallon and for each point of undesirable acid add .03 oz. $NH_4OH$ per gal. of solution.

It is not necessary to use $NH_4OH$ to neutralize the nickel solution if single salt solutions are used; $NiCO_3$ may be used instead of the $NH_4OH$. The amount used will depend on the purity of the $NiCO_3$.

If the chemicals used were 100 per cent pure, 1 fluid oz. $H_2SO_4$ would require 2.23 oz. $NiCO_3$, but as this would be unusual, it becomes necessary to know the percentage purity of the chemicals used. However, it is safe to use .02 oz. of the $NiCO_3$ per gallon for each point on the burette that is to be neutralized.

13.81 grams $H_2SO_4$ per liter is equal to 1.84 oz. Avor. per gallon, or 1 fluid oz. It takes 14.937 grams $Na_2CO_3$ to neutralize 13.81 grams $H_2SO_4$; therefore a solution of $Na_2CO_3$ must be made up to contain 14.937 grams per liter. This is approximately 2 oz. per gallon. This solution must be made very carefully, as the acid cannot be weighed or measured very accurately. The $Na_2CO_3$ is first dried at about 100 deg. C. for 1 hour or more; it is then cooled in a desiccator to room temperature and weighed as quickly as possible, dissolved in about 500 c.c. $H_2O$; pour into a liter flask, rinse the glass several times with $H_2O$, pour this also into the flask and then fill nearly to the mark. It is a good plan to make all solutions to a certain temperature. I have taken 22 deg. C. as my standard; this is about 71.6 F.; when the solution is at the proper temperature fill exactly to the mark; after mixing very thoroughly it is ready for use. Accuracy here spells success later.

8 c.c. of the C. P. concentrated $H_2SO_4$ is poured into about 500 c.c. $H_2O$, and when it has cooled to about room temperature dilute to about 1,025 or 1,050 c.c. This need not be measured very accurately, as the acid solution must be standardized with the alkali solution, that is, 10 c.c. of one must just neutralize 10 c.c. of the other.

A burette is rinsed once or twice with a little of the $Na_2CO_3$ solution and filled to the O mark. 10 c.c. of the acid solution is poured into a 25 c.c. beaker and a few drops of methyl-orange added, also about 10 c.c. $H_2O$; now bring this under the burette and add the $Na_2CO_3$ a drop at a time until the color just turns yellow; note the number of CC used, then calculate the amount of $H_2O$ to be added, as follows: Suppose 9.5 c.c. had been used on 10 c.c. of the acid, then each 9.5 c.c. of the acid solution must be diluted to 10 c.c., or by proportion the amount of $H_2O$ to be added is calculated as follows: 9.5 : 10 :: 1,000 : x. x = 1,057.63. The acid is too strong and each 1,000 c.c. must be diluted to 1,057.63 c.c. Now measure out exactly 1,000 c.c. of the acid solution in a liter flask, pour into a clean, dry bottle, pour 25 c.c. $H_2O$ into the liter flask, rinse and pour into the bottle; now again pour 27.63 c.c. $H_2O$ into the flask, rinse and add to the bottle. Mix very thoroughly and titrate again, this time if the work was done carefully, 10 c.c. of one should use 10 c.c. of the other. If, however, they do not correspond, another correction must be made.

Now take 10 c.c. of the Ni solution and pour into a 25 c.c. beaker: add 10 c.c. $H_2O$ and a few drops of methyl-orange and titrate with the standard $H_2SO_4$ solution until the solution just turns red. Each .1 c.c. used on the burette is equal to .01 fluid oz. of 66 degree B. $H_2SO_4$ per gallon, or .03 fluid oz. of 26 degree $NH_4OH$, when 10 c.c. of Ni. solution is taken for test. That is, if the solution is too acid, .03 fluid oz. $NH_4OH$ is added for each point to be neutralized, and if the solution is too alkaline, .01 fluid oz. $H_2SO_4$ per gallon.

*Read at Chicago branch banquet, February 28, 1920.

# The Elements of Electro-Chemistry

## Some Instructions for the Plater Who Wishes to Understand the Theory of What He Practices Daily

Written for the Metal Industry by JOSEPH HAAS, JR.—Ninth Paper*

### Electro-Chemical Series.

The electro-chemical series of metals is an expression of their electrode potentials. In the table of potentials any metal is considered electro-positive to all that follow it and electro-negative to all that precede it. Any member in it will chemically replace all metals that follow it and will in turn be replaced by those that precede it in the series.

### Practical Value of Electrode Potentials and Electro-Chemical Series.

The first thing that strikes our attention is that we can readily see why successful plating of iron, zinc and lead cannot be done in the acid copper solution. Those metals have a higher potential than Cu and will therefore replace Cu ions from a solution of its salts. The deposit is powdery and non-adherent and cannot therefore be subsequently deposited and receive an adherent coating. A look, however, at the electrode potentials of Fe and Pb in cyanide solutions shows those metals to be electro-negative to Cu; hence, the use of the cyanide copper bath in plating these metals. However, Zn is electro-positive to Cu, but the difference in P.D. is so small that a careful plater has no difficulty in copper plating this metal. But, other physical properties of Zn make the copper or brass plating of Zn inadvisable. Zinc has the property of being able to absorb into itself deposits of copper or brass, a fact that any plater can prove for himself by plating some zinc and placing it away for observation. The table of potentials explains, also, the difficulty in plating die castings and zinc in the ordinary nickel solution, but a special nickel solution can be prepared so as to lower the P. D. of Zn to such an extent that successful direct nickel plating can easily be done.

The reason for mercury dipping brass, copper and nickel-silver can readily be understood. From the table of potentials in cyanide solutions the potential of copper is so much above that of silver that silver is displaced from the solution.. By dipping into a solution of mercury, the surface may be considered to be one of mercury, which is electro-negative to that of silver. Electrode potential again plays an important part in the nature of a brass solution. Make a solution of copper and zinc sulphates and electrolyze. It is impossible to get a deposit of brass. Copper only is deposited. The electrode potential between Cu and Zn is so great that if any Zn is deposited at all it immediately reacts with $CuSO_4$ in the solution, displacing $Cu^{++}$ ions and going back into solution. But in the cyanide bath, the P.D. is so small that the zinc in the deposited brass cannot displace the $Cu^{++}$ in the solution as fast as the Zn is deposited.

The table of potentials ought to increase the plater's knowledge of rust-proofing, a subject that arises from time to time with increasing vigor. The cause of rusting has been assumed to be thoroughly explained by the theory of "electrolytic corrosion." This theory is based on the action of the galvanic cell. The surface of iron and steel is not homogeneous in chemical composition, and there is sure to be some carbon alloyed with the iron. The potential of alloys is lower than that of the pure metal. Consequently, the carbon alloy and the pure Fe, when the surface of iron or steel becomes moist, form a galvanic cell, the Fe possessing the higher potential and therefore corroding and forming rust ($Fe_2O_3$).

The formation of $Fe_2O_3$ forms more galvanic cells, so that a surface of iron or steel is completely covered with galvanic cells. This explains why iron and steel, after once starting to rust, rusts very rapidly. According to the theory of "electrolytic corrosion," the metal of the higher potential is the anode of the galvanic cell and consequently is the metal corroded. So much for iron and steel of this nature. Let us now consider iron and steel, nickel or copper plated. While the surface of the nickel or copper plate remains without a break or peel, corrosion is impossible. But if the nickel or copper is broken at any place it will rust rapidly.

The table of potentials explains the reason why. Copper and nickel are electro-negative to iron, and again we should expect the iron to be the metal corroded, because it is the metal of the greater potential. What has been said in regard to unplated iron corroding applies equally as well to the so-called guaranteed rust-proof method of producing a black oxide of iron ($Fe_3O_4$) on steel. Unless the coating is very heavy—and I have failed to hear of or see any method except the heat method that produced heavy coatings—the $Fe_3O_4$ once chipped off exposes Fe underneath to the action of rust.

Let us see if iron and steel can in any way be protected from rusting. Theory tells us that we must choose metals electro-positive to iron. Our table of potentials suggests that of the metals that can be deposited from aquaeous solutions are cadmium and zinc. Cadmium is expensive and therefore out of the question, so zinc alone remains, and that is nothing new to the plater. But the reason why zinc is a rust protector, maybe. Let us see why zinc is more electro-positive or has a higher potential than iron and steel and is therefore the metal that should be corroded if the surface of the iron is exposed and the object becomes moist. Let us follow in detail what happens. The zinc being the metal with the higher potential has oxygen given off at its surface, or in other words, it is the anode of the cell, while the steel is the cathode, and hydrogen is given off at its surface. Hydrogen is not a corroding agent, but is in fact a reducing or rust preventing agent. Therefore, as long as any zinc remains on the object to any appreciable extent, rust will hardly form.

### Discharge Potentials and Over-Voltage.

The electrode potentials may be looked upon from a point of view of electrolysis as well as from current generation. In order to deposit zinc in quantity upon a cathode from a solution, it is necessary that the difference in potential between Zn and solution be compensated by the electrolyzing current, for as soon as some zinc has been deposited on the cathode, the electrode is to be assumed to behave as a Zn electrode and tends to go back into solution. Therefore the potential which an electrode must assume in order that a particular metal be deposited upon it has been termed the "discharge potential" of that substance.

The discharge potential of hydrogen plays an important part in many plating solutions. The discharge potential of hydrogen on a platinum electrode has been

*This series was begun in April, 1918.

chosen as the standard and has been accepted at 1.12-1.15 volts. The voltage at which hydrogen appears on the cathode varies with different materials. The difference in volts between the discharge potential of H on a Pt electrode and on any other electrode is called the over-voltage of H on that metal. The reason why hydrogen appears in nickel, zinc and brass solutions is that the cathode has assumed a potential for its discharge, and consequently H from the water is evolved. But in the silver solution, plating is done at a volt or less and therefore no H is evolved.

### Polarization of Counter E. M. F.

By polarization is understood the appearance of a current passing in the direction opposite to that of the current conducted into the solution, the main current being thereby weakened. Of course, if there is a current flowing in the opposite direction to the main current, there must be an E. M. F. behind it. The cause of this E. M. F., like that of any galvanic cell, consists of two unlike electrodes immersed in an electrolyte. Whenever polarization happens, investigation shows that in some manner the system has become unsymmetrical by a change in the electrodes, concentration at electrode areas, or temperature changes in the film of solution in contact with electrodes.

Platers have frequently seen the amperage and voltage drop on the instruments connected to their tanks, and it was due to this polarization. Zinc solutions show the greatest polarization effects. One of the main reasons why zinc plating must be carried on at high voltage is that polarization takes place very easily in zinc solutions. In the acid, or cyanide baths as prepared ordinarily, H is evolved at the cathode and the anodes coat up with a greyish-white scum. There is an immense drop in voltage due to the fact that we have cell practically consisting of

$$H \mid \text{electrolyte} \mid Zn\ (OH)_2\ ZnO$$

which has a high E. M. F. value.

The plater can easily measure by having a voltmeter connected across the terminals of a tank while the current is flowing and then suddenly interrupt the current and note the pressure between the electrodes immediately after. Polarization, of course, is undesirable and if possible it would be better for the plater if he did not have to contend with it. But in the case of certain solutions it cannot be entirely overcome, although it can be, to an appreciable extent, diminished. By motion of the cathode rods hydrogen can be prevented from clinging to the cathodes. The coating of the anodes in brass, cyanide copper, bronze and zinc solutions can be prevented by the use of Rochelle salts and sodium citrate.

### Decomposition Voltage.

When a dilute solution of $H_2SO_4$ is electrolyzed with a small current between platinum electrodes, there is an evolution of gas for a moment which soon ceases. When a dilute solution of $ZnSO_4$ is likewise electrolyzed, Zn is deposited on the cathode and oxygen is evolved at the anode. Here, too, electrolysis soon ceases. If the electrolysis is discontinued and after a while resumed, the same results are obtained. But if the current is slightly increased, the process can be carried on a little further before it ceases. The cause of this phenomena is that in the case of $H_2SO_4$ we have a cell of the type,

$$H_2 \mid \text{electrolyte} \mid O_2$$

and in the case of $ZnSO_4$,

$$Zn \mid \text{electrolyte} \mid O_2.$$

Both of these cells exhibited a certain definite E. M. F. due to the electrode products tending to pass back to the ionic state. The E. M. F. acts with opposite direction to that of the electrolyzing current.

In order, therefore, that continuous electrolysis may take place, an E. M. F. must be applied to the electrodes sufficient to overcome the back E. M. F. of the products of electrolysis, and the potential which is just sufficient to produce continuous electrolysis is called the "decomposition voltage" of the salt. This potential obviously is equal to the sum of the electrode potentials, plus the bath potential, or potential fall between the electrodes. The decomposition voltage, like electrode potential, depends upon the concentration of the ions. The distance between electrodes, also, is a factor influencing the decomposition voltage of a salt, acid, or base.

The decomposition voltage of a salt, acid, or base is most simply found by measuring the current which passes when an E. M. F. of gradually increasing strength is applied to the electrodes. At first, an almost constant and very small current, called "residual current," is obtained, but after the applied E. M. F. reaches a certain value, the current begins to rapidly increase with increase in the applied E. M. F. The point where this rapid increase in electrolyzing current commences is the decomposition voltage of the particular solution. If one plots the current strength against the applied E. M. F., a curve, as shown below, is obtained. If the break in the current is not sharp, the value of the decomposition voltage is obtained by producing the almost horizontal branch to cut the production of the almost vertical branch. **Fig. 7.**

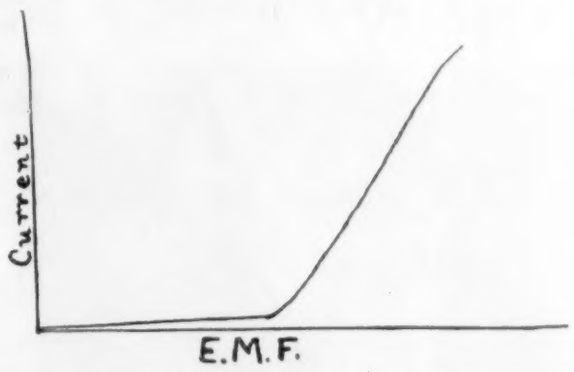



FIG. 7.—CURVE INDICATING DECOMPOSITION VOLTAGE.

### Two Color Work

If it is desired to produce two colors of gold upon the same article then the product is termed two color work. To produce the desired results the sections to be green gold colored must be stopped off while the rose gold color is applied, or vice versa. For this purpose secure from some reliable manufacturer an air drying asphaltum paint. Thin this if necessary with turpentine to the proper consistency. Apply the paint with a small pencil brush to the parts to be green gold colored, making sure that the part is completely and uniformly covered. Let the paint dry for several hours and then plate as usual with rose gold. Dry out and remove the paint by immersing the article in gasoline or benzine. Now repeat the painting operation coating over the rose gold color with the paint. When thoroughly dry apply the green gold to the unpainted surface. When the operation is completed remove the paint as noted.

If three colors are to be applied then three coats of paint will be necessary.—C. H. P.

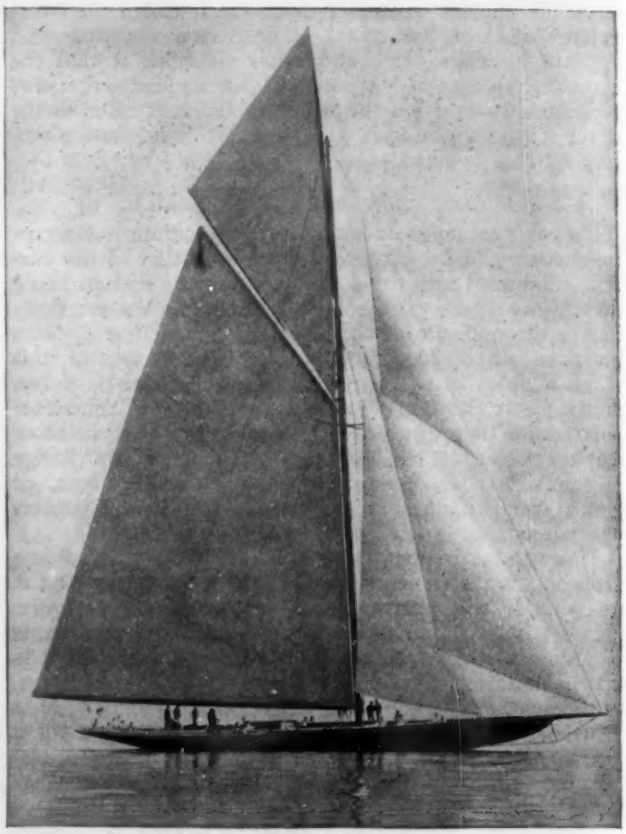
# The International Yacht Races

## A Few Points in the Coming Contests of Interest to the Metal Industries

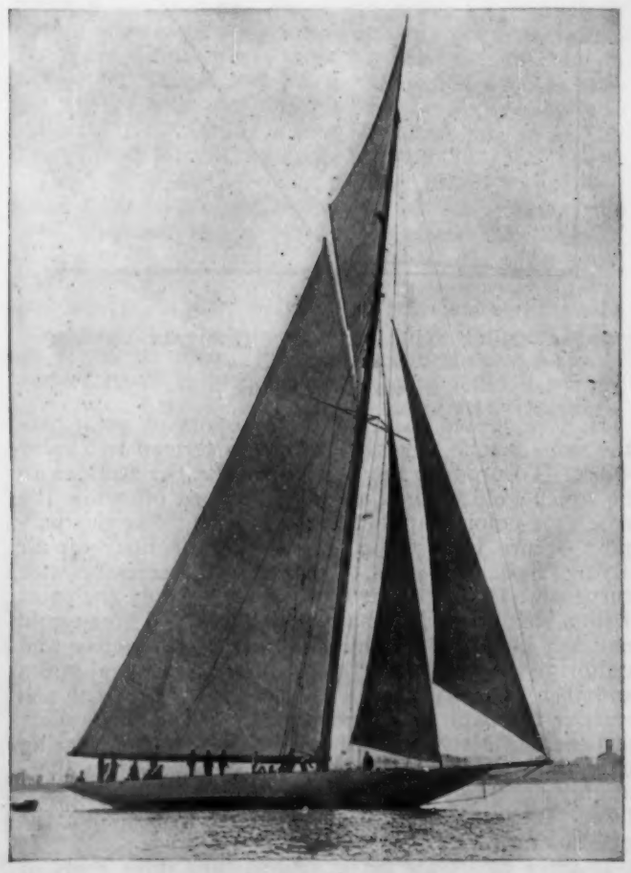
On July 15, the thoughts of a large part of the country will turn from the business, war, labor and other little things that happen to be occupying them at the time to a really important event, the Cup Races. The 13th series of races will start for the famous trophy, which has been in the hands of the United States for so many years. There will be five races, and the Cup will go to the yacht which wins three. Sir Thomas Lipton is again challenging, this time with Shamrock IV, the yacht designed by Chas. E. Nicholson, and built by Camper and Nicholson. Shamrock IV was built in 1914, and prepared to challenge then, but the war interfered. America will be represented by the Resolute, which was designed and built by Herreshoff. This boat was chosen over the Vanitie, designed by William Gardner and built by Lawley.

In describing these boats THE METAL INDUSTRY is far afield. We are laymen on yachting and our interest in these races centers about two points; first that it is an international event in which we are represented; second, these vessels, like all others, use a large amount of metals in their construction and fittings. There is an added interest to us in the fact that, peculiarly enough, the race is not only an American boat against an English boat, but a metal boat against a wooden boat.

Shamrock IV has a deck of birch veneer, 5/8 of an inch thick. Distortion of the hull is guarded against by veneer bulkheads made of birch on each side of the hull. It is also stiffened longitudinally. Her designer believes, evidently, in the strength of wood, which has been properly selected, seasoned and correctly placed. The hull is covered with three layers of mahogany, two layers of which are 1/2 inch thick, running diagonally at 40 degrees to the vertical and in opposite directions. The 5/8 inch thick outer layer is placed longitudinally. Her designer's confidence in her strength and seaworthiness seems to have been justified by the fact that she has been sailing for 7 years, has crossed the Atlantic, has never need caulking or sprung a leak. In addition, the light material makes it possible for Shamrock IV to carry a larger hull, a heavier keel and, consequently, much greater sail area.



VANITIE—THE DEFEATED BOAT.



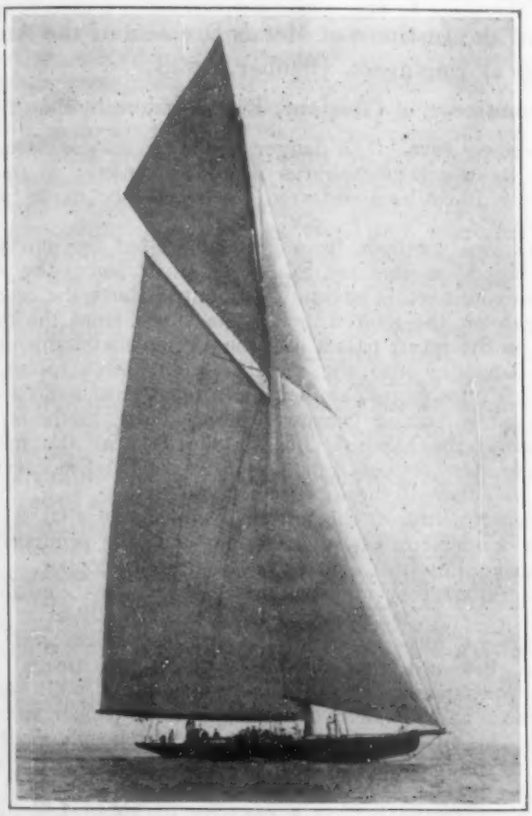
RESOLUTE—THE CUP DEFENDER.

The American boats have hulls of nickel steel framing, sheathed with manganese bronze 7/40 of an inch thick at the bottom, which is the heaviest part. Their keels are, of course, lead, like that of Shamrock IV. Both their masts were originally nickel steel with angle iron stiffeners. Their gaffs are of Duralumin.

In other details, however, they diverge. The Resolute has a deck of 7/32 inch aluminum plates covered with canvas and sand. The Vanitie has a light pine deck, built on nickel steel beams. Both the Resolute and the Vanitie have wire rigging of plow steel, but that of the former comes from John A. Roebling Sons Company, Trenton, N. J., while that of the latter comes from the American Steel and Wire Company, Chicago, Ill. The Resolute has cleats and turnbuckles of steel, the Vanitie has them of bronze. Some of the cleats on the Vanitie, however, are made of Monel metal. Her blocks have aluminum shells, and bronze pins and

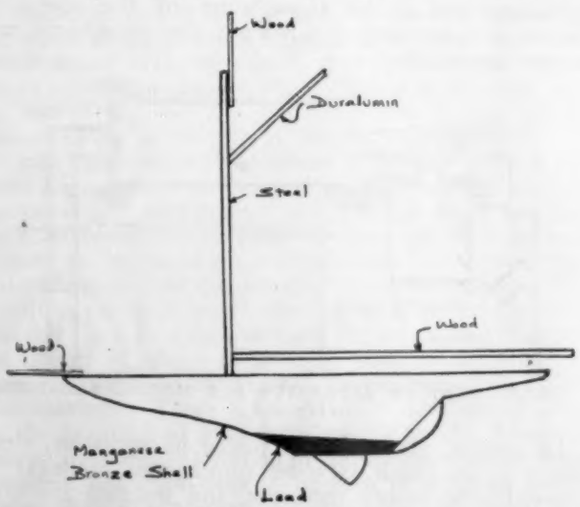
sheaves. The sketch shows the general construction and metals used on the different parts of the American boats.

Both of the contestants have had a considerable meas-



SHAMROCK IV—THE CHALLENGER.

ure of difficulty in their trials. The Shamrock has been laid up by broken spars and by changes in her design to conform with the rules of the race. Her keel has been lightened by eight tons, and her boom shortened by 30 inches. Some of her spars have snapped and it has been difficult to obtain good wood to replace them. In addi-




METAL PARTS OF AMERICAN YACHTS.

tion, there has been difficulty in finding good men to do the work. However, she seems at last to be in just the right condition for the race.

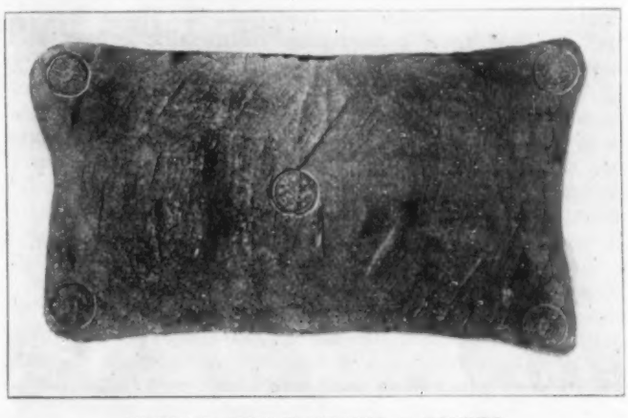
The Resolute has also had a number of accidents in her trial races with the Vanitie, one of which resulted in her replacing the steel mast with one of hollow wood.

It will be necessary for Shamrock IV to give the Resolute a considerable handicap in the form of a time allowance because of her much greater sail area. The following table gives the measurements of the three yachts:

| | Shamrock IV | Vanitie | Resolute |
|---|---|---|---|
| W. L. Length | 75′ | 75′ | 75′ |
| Draft | 13′9″ | 13′9″ | 13′9″ |
| Beam | 22′4″ | 22′ | 21′ |
| Overhang aft | 18′ | 21′ | 15′ |
| Overhand aft | 18′ | 21′ | 15′ |
| Length over all | 110′6″ | 118′6″ | 106′ |
| Fore triangle base | 55′ | 55′5″ | 48′4″ |
| Boom | 86′ | 79′5″ | 78′ |
| Deck to topmast | 148′ | 135′ | 130′ |
| Lead, tons | 67 | 65 | 65 |
| Displacement, tons | 106 | 107 | 105½ |
| Sail area | 10,800′ | 9,600′ | 8,650′ |

## THIRTY-ONE POUND COPPER COIN

Weighing 31 pounds, a single copper coin bearing the imprint of the Swedish crown and the name of the monarch, Charles X. Gustavus, during whose reign it was issued, has been acquired by the American Numismatic Society. The piece represents 8 "daler," equivalent to $5.20 in American money. It measures 23½ inches by 13 inches, and in form is a rectangular ingot bearing five large stamps punched in the center and four corners. These impressions were made in order to prevent a reduction in value by clipping. The coin was struck at Avesta, Sweden, in 1659, and is of a type which was minted continuously for 110 years, although the 8



SWEDISH COIN WEIGHING 31 POUNDS.

daler plates were issued only a short time and are now quite rare. This specimen was dredged out of the harbor at Riga, Russia. Large sized coins of this type were first brought out in 1649 during the reign of Christina, the daughter of Gustavus Adolphus. The object was to form an outlet for the products of the country's copper mines without depreciating the value of the metal.

## METALLURGIST NEEDED

The United States Civil Service Commission announces an open competitive examination for metallurgist. A vacancy in the Navy Yard, Norfolk, Va., at $10.80 per diem, and vacancies in positions requiring similar qualifications, at this or higher or lower rates of pay, will be filled from this examination.

Applicants must have reached their twenty-fifth but not their forty-fifth birthday on the date of the examination. Age limits do not apply to persons entitled to preference because of military or naval service.

# New Process for Making Fifteen Per Cent Phosphor-Copper

**A Paper to be Presented Before the Columbus Meeting of the Institute of Metals Division of the American Institute of Mining and Metallurgical Engineers, October, 1920**

**By P. E. DEMMLER, Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa.**

Phosphorus combines with copper in various proportions, forming true alloys, some of which are of commercial importance. These materials find wide application as deoxidizers and as a means of introducing phosphorus into other alloys, as in phosphor-bronze.

Phosphor-coppers containing 10 and 15 per cent of phosphorus are the commercial grades that are most generally offered. Each has certain advantages when used in making other alloys. The 10 per cent grade of phosphor-copper has an advantage over the 15 per cent in that it has a much lower melting point and can be prepared by certain methods with a much lower loss in phosphorus. The 15 per cent grade has the advantage of lower freight rates per unit of phosphorus and, by the method to be described, a uniform product can be prepared with practically no loss of phosphorus. Alloys of copper and phosphorus containing any desired percentage of phosphorus lower than 15 per cent can be prepared by melting together the requisite amounts of copper and 15 per cent phosphor-copper.

Processes for making phosphor-copper may be divided into two classes as follows: (1) Those depending on the smelting of phosphate rock or superphosphate of calcium with copper or copper-bearing materials, and coal or other carbonaceous material; (2) those depending on the direct combination of metallic copper and elemental phosphorus.

A number of formulas for preparing phosphor-copper according to the first method have been published. THE METAL INDUSTRY[1] gives the following: Superphosphate of calcium, 60 lb.; granulated copper, 30 lb.; finely powdered coal, 10 lb. Similar formulas are given by Brannt[2] and others, and detail variations are covered by patents, such as those of L. A. Jeffs[3] and H. A. Webster.[4]

Among the objections to this method of producing phosphor-copper are the large amounts of raw material and resulting slag to be handled, and the difficulty of getting a satisfactory fusion. S. Skowronski[5] found that at 1300° C. (2372° F.) it was impossible to get a good fusion even when silica sand was added as a flux. Globules of 15 per cent phosphor-copper were obtained in the experiment.

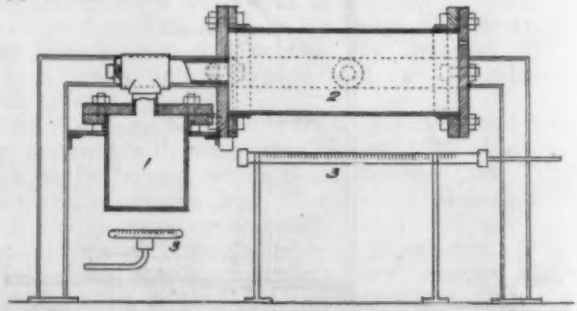
Methods of the second class, depending on the direct combination of copper and phosphorus, are generally used for the preparation of phosphor-copper. The usual practice seems to be to add the phosphorus to the molten copper by means of phosphorizers. The best practice by this method entails a phosphorus loss of at least 25 per cent. Besides the phosphorus loss, there is also the objection of the great danger of burns to the workmen handling phosphorus around the phosphorizers and molten metal.

The danger attending the handling of phosphorus may well be emphasized. Ordinary yellow phosphorus, such as is generally used, melts at 44.2° C. (111.5° F.). It will take fire at 34° C. (93° F.); that is, the heat of the hand is sufficient to ignite a piece of dry phosphorus. Material of this nature must be handled with exceeding care. The danger and wastefulness of methods by which phosphorus is added directly to molten copper have been referred to previously in technical literature.[6]

Various methods have been suggested for obviating the objections referred to. E. G. Burr[7] places the phosphorus in a retort adjustably mounted above the crucible containing the molten metal; the vapor from the material in the retort passes into the molten metal through a pipe dipping into the metal. E. Schulte[8] forces the molten phosphorus, air being excluded, into molten copper by hydraulic pressure. Both these methods aim to avoid the handling of phosphorus near the molten copper, but serious difficulties are met in the carrying out of either of these processes.

Experiments of the author have shown that a uniform 15-per-cent-phosphor-copper could be produced by passing phosphorus vapor over heated copper. The most satisfactory temperature of the copper was found to be 400° C. (752° F.) Phosphorus boils at a comparatively low temperature, approximately 290° C. (554° F.), and when this vapor passes over heated copper, combination takes place immediately with incandescence and incipient fusion. Pieces of copper wire up to ¼ in. in diameter are completely phosphorized by this method. The advantages of a process of this kind can readily be seen.

An apparatus having a capacity of about 130 lb. of phosphor-copper was constructed to demonstrate the commercial value of this method; its main features are shown in the accompanying illustration. This apparatus consists of a retort for heating and distilling the phosphorus, a container for the copper, and fittings to connect the two. Suitable supports are also provided. The apparatus is made entirely of iron, which is not attacked by phosphorus at the temperature of the operation. Means are provided for heating the phosphorus and copper separately.




ARRANGEMENT OF APPARATUS FOR MAKING PHOSPHOR COPPER.

To operate, phosphorus is placed in the retort, clean copper scrap (such as wire, turnings or millings) is placed in the copper container, and the two are connected. Tight joints should be made by using suitable gaskets to prevent loss of phosphorus. A hole drilled into the plate covering the end of the copper container prevents increase of pressure within the apparatus. The copper is heated to 400° C. before heat is applied to the

[1] N. Y. (Aug., 1917) 351. [2] "Metallic Alloys," 245. [3] U. S. Patent 1268849. [4] U. S. Patent 1265150. [5] Private communication. [6] J. L. Jones, THE METAL INDUSTRY (Aug., 1917) 351. [7] Brit. Pat. 125785, May, 1918. [8] German Pat. 281293, March, 1913.

phosphorus. With the small apparatus we have been able to distill the phosphorus at the rate of 30 lb. per hour.

Phosphorization to 15 per cent phosphor-copper takes place in one step, no intermediate products being formed if conditions as to temperature are observed. When more copper is charged than is necessary to combine with the phosphorus used, the copper nearest the phosphorus retort will be completely phosphorized, while that farther away is unchanged and can readily be separated from the phosphorized product. The same action was observed when phosphorus vapor was passed over heated copper turnings in a glass tube several feet long. The progress of phosphorization could be observed and, whenever the supply of phosphorus ceased, there was a sharp separation of the 15 per cent phosphor-copper and the unphosphorized copper.

The product of phosphorization by this method is a black, brittle mass. Freshly fractured surfaces show a bright luster. It is interesting to note that phosphorized wire frequently is hollow, presenting the appearance of tubes. Owing to the incipient fusion due to the heat of the reaction, the phosphor-copper may be removed from the apparatus in lumps and used in this form, or it may be remelted and cast in any desired mold.

The products from several heats made as described were melted in crucibles and cast into ingots. A composite sample made by taking pieces from each ingot, pulverizing and mixing, analyzed 15.11 per cent phosphorus. Pieces taken at random from the several heats showed a very uniform phosphorus content of 14.9 per cent to 15.1 per cent. Red phosphorus was used in several cases and the same product obtained, but owing to the much slower rate of volatilization of the red phosphorus, the rate of phosphorization is correspondingly less than when the ordinary yellow phosphorus is used.

The method of making phosphor-copper containing 15 per cent of phosphorus, as outlined above, has the following marked advantages over other methods:

(1) The copper need not be heated over 400° C. (2) The phosphorus need not be handled near hot or molten metal. (3) There is no loss of phosphorus. (4) The product is uniformly 15 per cent phosphor-copper.

Neither the 10 per cent nor the 15 per cent phosphor-copper represents definite, simple chemical compounds. Heyn and Bauer[9] state that the phosphorus exists in the alloys as $Cu_3P$ and $Cu_5P_2$, which compounds contain 14.00 and 16.34 per cent, phosphorus, respectively, from which it would appear that the 15 per cent phosphor-copper may be a mixture of the above mentioned phosphides in almost equal proportions. The uniformity of the product obtained in all the different heats made by this method would indicate that the reaction between phosphorus and copper reaches its equilibrium at a definite point each time under the conditions as outlined above. The same principle of forming compounds or alloys of volatile with less volatile elements may be used for preparing other alloys than phosphor-copper. We have prepared in the laboratory, by the method described, compounds of phosphorus with tin, zinc and cadmium; of arsenic with copper, silver, lead and cadmium; of selenium with copper.

[9]Jnl. Soc. Chem. Ind. (1906) 25, 1047.

# Substituting Bronze and Brass

It is a well-known fact that through the exigencies of the war, Germany's available stocks of bronze and brass were rapidly diminishing, causing manufacturers to exercise the utmost economy and thereby stimulating the invention and utilization of all kinds of substitutes of a more or less serviceable nature. It can hardly be said that there was any serious apprehension on the part of manufacturers on this subject while the war was still going on, it being confidently anticipated that with a victorious conclusion of the war and the expected indemnity, the question of procuring urgently required raw materials would easily be solved, thus rendering a further use of substitutes unnecessary. While it is true that with the end of the war and the subsequent raising of the blockade some of the inferior brands of metal substitutes gradually disappeared and others underwent an improvement, a good many are being retained on account of their cheapness and serviceableness. Though many German firms feature advertisements for their machines by such slogans as "made of pre-war materials"; "No war-time materials enter into the construction of our goods"; "No substitute materials used"; the fact remains that Germany will feel for a long time to come yet the pinch of copper, the import of which on a large scale is rendered extremely difficult in face of the depreciation of the German currency. There is some talk in the German press on the granting of long term credits by the American Copper Finance Corporation to European countries being imminent but it remains to be seen to what an extent Germany will be allowed to participate. It should also not be overlooked that while some fine specimens of machinery were displayed at the last exhibitions and fairs, there is admittedly a good deal of "window dressing" being practiced on those occasions. Moreover, a perusal of the German technical press clearly reveals the fact that—mainly for the aforementioned economic reasons—many of the substitutes hitherto employed have come to stay. It is pointed out that while in most cases the surface properties of bronze and brass are utilized only, the use of these metals should be confined to such parts as are subject to sliding friction under high pressure, calling for greater hardness and special chemical resistibility. It has also been shown during the war that with the development of modern casting technics the difficulty experienced in producing satisfactory castings of parts formerly exclusively made of brass or bronze has considerably decreased. Whenever for certain reasons iron or steel does not enter into consideration, the use of a brass composition poor in copper and free of tin, or such compositions as manganese bronze, steel-bronze, "Delta metal," etc., is suggested, while in many cases a properly applied coating of zinc, lead or brass will give entirely satisfactory results. Pressed and stamped parts formerly made of bronze are now advantageously made of iron or brass, and bushings, cocks, large bearing halves, spindles, casings, etc., made of iron and brass-plated are claimed to have been a success. It is also interesting to note that bronze wormwheels are now frequently substituted by wheels made of a special kind of cast iron produced either in the crucible or in an oil furnace and it would appear that with a special heat treatment these wormwheels are almost equal to bronze wheels as regards strength and elastic properties. Worms are made of hardened steel as before and with a lubricant of high viscosity very few complaints have come to the notice of the writer. Moreover, the course of development of the German submarine construction furnished ample proofs that—with rare exceptions—the substitution of bronze by steel castings, special brands of cast iron and compositions poor in copper has produced satisfactory results.

# Spoon and Fork Blanks

## Defects in Manufacture and Their Causes in English Practice—Part 2*

By J. A. MORTON

Mr. Morton expressed the view that the cracks appearing at the place indicated by Mr. Turner were due to excessive work while rolling, or imperfect annealing before reworking. They appear at the time of rolling and can be more properly called "work cracks," than fire cracks. The blank shown in Fig. 3 has purposely been made to crack in this way, to illustrate the point.

The same kind of crack can be induced by the practice of rolling spoons after flying out or shearing, without first annealing. The shears develop a local hardness on the edge of the blank and minute edge cracks develop on cross-rolling at the point indicated by Mr. Turner, so fine as to be invisible to the naked eye until a further opening of the crack is brought about in the later stages of rolling—Fig. 4. He would strongly advise that for safety all blanks should be annealed before initial rolling, that is, after shearing.

Referring to the paper read before this society, in which the author said that nickel silver could be quenched from a red heat without danger of cracking, he could not agree for a moment. Fig. 5 represents a water quenched spoon blank which developed cracks entirely due to such quenching.

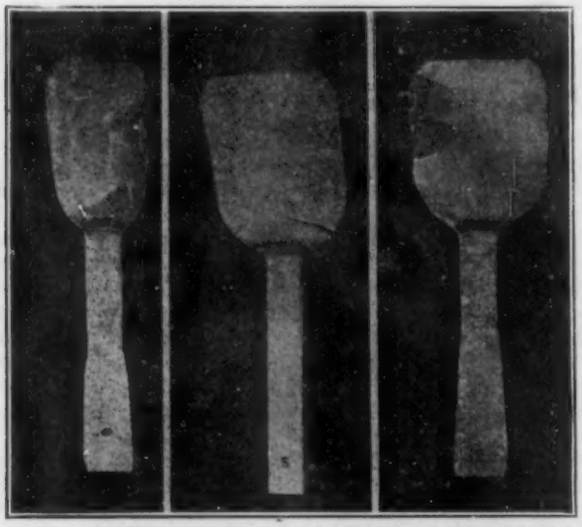


FIG. 3.—WORK CRACKS FROM INSUFFICIENT ANNEALING.

FIG. 4.—CRACKS FROM ROLLING AFTER SHEARING WITHOUT ANNEALING.

FIG. 5.—CRACKS FROM WATER QUENCHING.

In Mr. Turner's paper, emphasis was laid upon the need for rolling the strip all in one direction, and the same way up, so as to facilitate the correct flow of the metal. Any divergence from such practice would, he said, lead to trouble. That might be true, and the fact that in cross-rolling for spoons and forks the exact opposite was carried out, and that drastically, ought to make us careful to eliminate all contributory factors that make for failure—whether arising from impurities or bad mechanical or thermal treatment. It is indeed wonderful that, given good material and fair treatment, so few failures occur. Curiously, Mr. Morton found that if the strips are cut so as to roll in the same direction as the original ingot was rolled, the liability to crack was greater. He was in favor of a maximum amount of work being put upon the metal, at each pass during the rolling of the original ingot, consistent with the malleability of the metal and the strength of the rolls, but in cross rolling it was well to remember that only part of the blank was being rolled, and apart from the danger of cracking due to excessive work, there was a possibility of getting longitudinal as well as transverse extension, resulting in the second pass not entirely covering the first area (due to the safety flange), and we have a sharply defined line representing a single rolling and a double rolling, which of course means unequal stresses and danger of cracking.

Another stage in which fire-cracks occur is in the annealing of fancy stamped blanks—and such failures occur even in pure alloys. Such examples are illustrated in Fig 6.

FIG. 6.—FIRE CRACKS.

If we consider the manufacture of such ornamental pattern spoons, we realize that an enormous amount of work is necessary to bring up the pattern sharp and clear. In order to lengthen the life of a die it is usual to partially strike up the pattern, anneal, and bring up to sharpness by a second and very heavy blow. It is at this point of intermediate annealing that the failures occur. They may be prevented, however, by the process of "springing," which consists in bending the shank sharply first one way and then another, by striking them with a blunt nosed horn or wooden mallet on a recessed soft metal block. After this process they may be annealed with safety. The stresses set up during stamping are obviously almost entirely compressive and opposite in character to those of rolling. This compression must be very considerable in the ornamental spoon ends, and on consideration, it will be seen that the stresses are by no means regular, as when the ornament is seen to be sharp, it means that the high relief metal has been scarcely compressed at all, since the operation stopped as soon as sharpness was obtained; whereas the bottom of the ornament has sustained the blow of hammer and bed every time. Hence the great danger of cracking on annealing so irregularly and intensely stressed material. This compressed condition, Mr. Morton added, can be such that one might imagine an almost explosive violence evinced

*Part 1 was published in our issue of June, 1920.

when the blank is exposed to heat. The operation of "springing" was a very useful one to the trader, and Mr. Brook informed him was used in other trades to relieve the stresses in hard worked material. He described it as a sort of shock medicine—inducing a molecular rearrangement something like what the electrician suggests takes place when steel is brought into a magnetic field.

Fig. 7 shows the effect of immersion of hard and annealed blanks in mercurious nitrate—the centre one, hard rolled, showed a crack after one hour's immersion—the right-hand blank, annealed, showed no crack even after 24 hours.

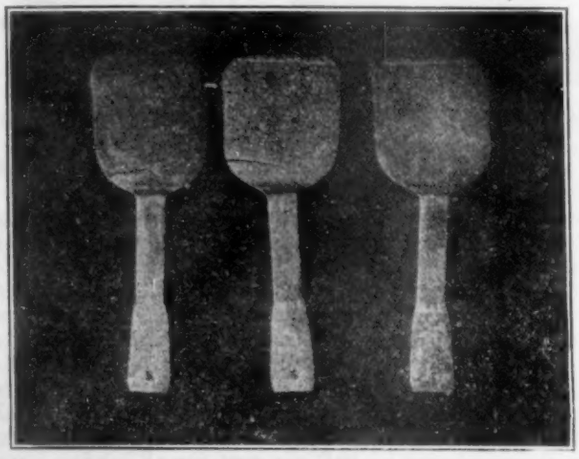


FIG. 7.—EFFECT OF MERCUROUS NITRATE ON HARD AND ANNEALED BLANKS.

Mercurious nitrate was largely used by the Americans during the war to discover overstrained or irregularly strained material. Its action is a corrosive one, and as this proceeds, the stresses ultimately result in fracture.

The left-hand blank of Fig. 7 was rolled under the same conditions as the other two, but cracked during annealing, and it is interesting and instructive to note the similarity in the crack, both as to position and extension, as that obtained when its sister blank was submitted to the action of mercurious nitrate. It is also interesting to note that blank (A) cracked at a low temperature. It was held in a pair of tongs over a coke fire and the cracks could be distinctly heard and felt. It was still in the hard condition.

In conclusion, Mr. Morton submitted that a long experience, assisted by theoretical knowledge, led him to the conclusion that it was quite as important that spoon metal should be pure as in the case of holloware and the analysis of the original metal would save endless trouble and expense in eliminating failure at the later stages. There was an idea prevalent that metals which were of little use for anything else would do for spoons and fork manufacture—this idea was very much to be deprecated.

DISCUSSION.

Dr. R. S. Hutton agreed that some brands of commercial zinc gave rise to considerable trouble in alloys made from them. He advised limiting the percentage of zinc in German silver—he was inclined to the opinion that not only was the effect of impurities increased by the increasing proportion of zinc, but the alloy with high zinc content was mechanically weaker. He thought that many of the cracking problems brought forward by Mr. Morton were to a certain extent, if not closely, related to the season cracking discussed by Hatfield and Thirkell. Whilst impurities had considerable influence, mechanical work must not be overlooked, and he was inclined to disagree with the author altogether as to the cause of the cracking in all cases—it struck him that the single crack rather pointed to a plain two-directional stress—one would expect a large number of cracks if the cause was fairly regularly distributed impurity. Referring to some data published by the U. S. A. Bureau of Standards, relating to the value of low temperature annealing (300°—400°), Dr. Hutton said that such removed internal stresses, and applying this method to the work-hardened spoon blanks he had effectively reduced wastage. In one instance a large batch (yielding 90% wasters) was so effectively improved that the cracked blanks were reduced to 6%. He suggested that the process could be applied equally to the removal of the effects of grinding noted by Mr. Morton and also to completely finished spoons. On occasion he had found that the same metal sent to different rolling mills yielded in one case a considerable proportion of fire-cracked blanks, whilst the other two worked normally—this went to confirm his contention that this cracking trouble was very closely related to the mechanical treatment of the metal.

Mr. E. H. Hill thought a clearer distinction ought to be drawn before "work cracks" and "impurity cracks." He suggested that the vibration induced in rumbling, together with low temperature annealing, would materially solve this problem of overstrain and had personally found the method of advantage.

A subsequent speaker said that the University ought to be very proud to turn out men of Mr. Morton's stamp; he reflected on the character of the teaching, which must be good, and it must be a source of gratification to the teachers to find so much success attending their efforts. Here was a practical man, who having added seven years of study to his experience, was able to stand before them, present both sides of the problem, clearly, logically, and forcibly, and he thought every spoon and fork manufacturer in Sheffield should have been present.

Mr. W. G. Turner agreed with Mr. Gadsby—in his own works the blanks were close-annealed, charged cold and heated to 800°. He had carried through thousands of grosses without a failure. He also disagreed with Dr. Thompson's claim that nickel silver could be quenched without harm.

Mr. Morton, replying to the several points raised, thanked his audience for their attention and criticism. One point of interest was added relative to blanks of large area (cross-rolled ladle blanks). Towards the end of the operation it was necessary, in order to clear the guides, to roll these at an angle. If now turned over and passed through the rolls, one obtained a double strain, and it was safer to anneal after every pass.

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### Polishing Aluminum

The proper speed of polishing and buffing wheels is governed to some extent by the nature of the work to be buffed and polished. Your work requires a peripheral speed of 6,000 ft. per minute. It is rarely necessary to exceed 6,000 ft. per minute, although some manufacturers run as high as 7,000 ft. per minute, and for most purposes 4,500 ft. per minute is sufficient. If the buffs are well balanced and are suitably mounted on substantial buffing lathes, they are safe for speeds within the limits given.—P. W. B.

# Casting Losses in Aluminum-Foundry Practice in the United States

## A Report of an Investigation for the Bureau of Mines, Department of Interior

By ROBERT J. ANDERSON, Metallurgist, Bureau of Mines

### LOSSES IN THE PRODUCTION OF ALUMINUM-ALLOY SAND CASTINGS FOR THE LIBERTY MOTOR

During the recent war, losses in the production of light aluminum-alloy sand castings for the Liberty, Hispano-Suiza, Curtiss, and other aircraft engines, were uniformly high, particularly in the founding of crankcases and oil pans. Casting losses in the production of camshaft housings, intake and exhaust manifolds, and carburetor bodies were reasonably low, but the size and complexity of most of the aircraft engine crankcases (upper and lower halves) caused serious foundry difficulties. The chemical and physical requirements for aluminum-alloy aircraft castings were not difficult to meet, but the rigid inspection and salvage specifications caused losses which were much higher than those usually experienced in the manufacture of commercial automotive castings. Rejections of crankcases and oil pans for the Liberty motor were as high as 50.0 per cent at times in some large foundries, with an indicated average casting loss of about 30.0 per cent for all plants.

In the production of light aluminum-alloy castings to meet rigid specifications, higher losses must be expected than where no specifications, or only lax ones, are in force. Some of the difficulties in connection with the manufacture of aircraft castings during the war arose from labor troubles, lack of competent molders, lax supervision, and the general stress of the times; but many of the defects in rejected castings were traced to avoidable causes which in turn were the result of inadequate supervision.

### DEFECTS CAUSING LOSSES IN ALUMINUM-ALLOY SAND CASTINGS

Defective castings can be readily classified according to the kind and amount of the defects, but to determine exactly why a certain defect occurred, is a more difficult matter. The castings from a day's run in a foundry may be divided into (1) good castings; (2) castings with remediable defects which can be salvaged by welding, soldering, or other repairing; and (3) totally defective castings. As at times no sharp lines of demarcation can be drawn among good castings, those with remediable defects, and scrap castings, the inspection of castings calls for experience and good judgment. Whether a casting is rejected will depend upon the kind and amount of the defects, the use to which the casting is to be put, the amount and character of the subsequent machining in relation to the defects, and the rigidity of the specifications. A defect which causes one type of casting to be thrown out may be regarded as trivial or of no consequence in another type of casting.

Light aluminum-alloy sand castings may be rejected for defects resulting from one or a combination of causes, including cracks; sand holes; chill blows and core blows; cold shuts; hard spots; porosity, leaks, and general unsoundness; uneven walls and core shifts; hard and soft ramming; breakage on trucking, handling, chipping, and cleaning; cracking on welding; cope drop; short pour; dirty and broken cores, and sand or paste in the cores; run out; molds crushed in core setting; gates washed in; poor patching; wet sand; draws and shrinkage; warping; broken molds, and inferior metal. On account of the large number of variables in foundry practice, it is at times difficult to trace the exact causes for specific defects. However, the factors that will most likely cause defects in the castings can be classified; then it will be easier to trace the defects to a definite cause or combination of causes. By eliminating the causes, the defects will disappear. Admittedly, this is not always easy to do, but the first step to be made in attempting to reduce casting losses is a thorough diagnosis of the causes for defects.

### LOSSES IN THE PRODUCTION OF COMMERCIAL ALUMINUM ALLOY CASTINGS IN THE UNITED STATES

A recent survey of the aluminum-foundry industry by the Bureau of Mines has made data available regarding the losses sustained in the United States in the production of all kinds of commercial light aluminum-alloy castings. The average casting loss, including rejections of all kinds on the foundry floor, in the inspection department, and machine-shop returns, may be placed conservatively at 10.0 per cent. Variations in losses, as reported to the Bureau by numerous foundries, range from 0.0 to 75.0 per cent; no variation of losses is rare except for certain types of exceedingly simple castings, whereas 75 per cent is altogether too high. The indications are that an average figure of 10.0 per cent for all kinds of castings is approximately correct, although possibly a trifle low when referred to actual production records furnished by some representative foundries.

Figures for losses have been obtained for the production of a wide variety of commercial light aluminum-alloy castings including automotive castings such as crankcases, oil pans, manifolds, carburetor bodies, transmission housings, foot-boards, fans, wheel-hub caps, clutch cones, and covers; cooking-utensil castings; vacuum-cleaner parts; and miscellaneous castings for various purposes. The highest average losses are in the manufacture of automotive castings, with vacuum-cleaner part second, and cooking utensils next.

### MONETARY VALUES OF THE CASTING LOSSES IN ALUMINUM-FOUNDRY PRACTICE IN THE UNITED STATES

The total output of light aluminum-alloy sand castings of all kinds in the United States in 1919 is placed at 81,000,000 pounds. The cost of scrapping a pound of rough casting may be placed at $0.125, although variations are from $0.10 to $0.25. On the basis of the figures available, the total monetary values of the losses, incurred annually in the United States because of the rejection of defective castings, may be readily calculated:

81,000,000 pounds = total output
10.0 per cent = average casting loss
$0.125 per pound = cost of scrap
81,000,000 = 90.0 per cent of the actual castings poured, or
81,000,000 ÷ 0.90 = 90,000,000
90,000,000 × 0.10 — 9,000,000 pounds of castings scrapped
9,000,000 × $0.125 = $1,125,000, the total monetary loss.

If the present average losses could be reduced 50.0 per cent, which is possible by eliminating the occurrence of readily avoidable defects, a saving of at least $600,000 would accrue to the country.

# Melting Furnaces

## Some Factors to Be Considered in the Selection of Melting Equipment for Non-Ferrous Metals*

By THOMAS H. A. EASTICK

There is no "best furnace" or "best process" for the melting of brass and copper alloys any more than there is a best furnace or best process for making steel or glass. The kind of equipment or process to install for brass melting depends entirely on the conditions met with, a few of which may be enumerated:

(a) The metal or alloy, its melting point and casting temperature.

(b) Number of different alloys or mixtures in use and production per day of each. Is contamination of one alloy by another of importance?

(c) What kind of scrap is used; its nature, size and shape, etc.

(d) Sand molds or metal molds.

(e) Production per day and whether melting and casting must wait on preparation of molds or vice-versa. Twenty-four hour, 8 hour or intermittent operation.

(f) Size and weight of castings.

(g) Physical characteristics of the shop and the neighborhood where the work is to be done.

(h) What kind of fuel is in use, in quantity, for other furnaces in the plant. Accessibility to Coal, Gas, Electricity and Oil.

These are only a few of the variables met with and that they do vary may be realized on reflection that there are melting plants for 50-lbs. a day (of gold and precious metals, etc.) and for 500,000 lbs. a day; for casting pet cocks weighing ½ oz. and manganese bronze propellers weighing many tons, in sand, and extrusion billets weighing 500 lbs. and gold bars weighing 5 lbs., in iron molds; casting on the top floor of a six story loft building in a jewelery plant and casting in reinforced concrete building, 600′ x 100′, with a dirt floor; casting in a large plant with railroad siding for oil tank cars, in a plant in the natural gas region, at Niagara Falls with electric power for ½ or ¾c K.W.H. and in the coal district with coal in the back yard. And so we might go on indefinitely enumerating the enormous number of variables met with in melting and casting non-ferrous metals.

One set of conditions met with that are more or less common to all plants in that line, are those presented in the brass sheet, rod, wire and tube mill casting shops. Here, at least, we find standardized alloys, standardized molds and uniform production.

The desire to develop a cheaper method of melting than that of the old coal fired pit crucible furnace has grown rapidly in the last few years owing to the greatly increased labor costs and the scarcity of the skilled labor required. This desire has led to the introduction of oil and gas fired stationary pit crucible furnaces, oil and gas fired tilting crucible furnaces and oil and gas fired non-crucible or reverberatory furnaces, and lastly of electric furnaces of various types. The brass mills have unfortunately never shown much interest in oil or gas fired furnaces for reasons which are not apparent. Possibly for the mistaken idea that the "fuel is expensive," overlooking the fact that fuel cost is only a small factor in the cost of a satisfactory product. Another possible reason is the idea that "injurious gases" are absorbed by the metal and cause blow-holes, spills, etc. The products of combustion of oil or gas are no different than of coal. There are no "injurious gases" and there does not appear in all the literature on copper alloys a single authentic proof of bad metal caused by the products of combustion. A typical analysis of the burned gases or products of combustion of fuel oil in a well designed and properly operated furnace, is as follows:

| | |
|---|---|
| Carbon dioxide | 12.5% |
| Oxygen | 0 |
| Oil vapor | 0 |
| Carbon monoxide | 2.1% |
| Nitrogen | 85.4% |

(Bullen's "Heat-Treatment of Steel")

Oil and gas fired crucible and reverberatory furnaces have been used to some extent by foundries and sand casting shops with fair results. There are, however, many poorly designed furnaces of this type on the market the performance of which has tended to discourage the trade in their use, and further, even the furnaces of merit are rarely operated properly, this being usually left to uninstructed labor and the poor results obtained blamed on the furnace.

Within the last two or three years the electric furnace makers have come forward with many designs of furnaces for melting brass. There are three types of these on the market at the present time which may be said to have successfully operated on a commercial scale, namely,

Carbon Resistance Type Furnace
Rocking Arc Type Furnace
Induction Type Furnace.

In considering equipment for brass melting it is very improper and misleading to speak of "electric furnaces," "oil furnaces," etc., and to compare an "electric furnace" with a "gas furnace" or an "oil furnace" with a "coal furnace." The fuel, that is to say gas, coal, oil, electricity, etc., is the source of heat and it is the application of this heat to the work which is the all important feature. There are well designed and badly designed electric furnaces just as there are well designed and badly designed gas furnaces, etc., and the principal claims set forth by the electric furnace makers are:

1. No crucibles are required.
2. No coal and ashes to handle.
3. Less zinc loss.
4. Lower labor cost.
5. Better metal than by any other method of melting.

It is unfortunate that these claims have been made without sufficient presentation of authentic facts to back them up, and without, at the same time, pointing out that the economies effected with the electric furnace are also possible with fuel fired furnaces. Let us check over the claims enumerated above in comparison with various other types of fuel fired furnaces, crucible and others.

**1. No crucibles are required.**

Neither are crucibles required with an oil or gas fired reverberatory furnace, on the other hand the advantages of the crucible process are lost just as much with the electric furnace as with the fuel fired furnace. These advantages, as is well known, are the flexibility, control, ease of stirring and skimming, all resulting from the small unit or charge.

**2. No coal to handle and no ashes to put through the metal recovery process.**

This same advantage, of course, prevails with any "liquid" fuel fired furnace, crucible or reverberatory. By a "liquid fuel" is meant any fuel that can be transported mechanically or piped.

*Courtesy of Joseph Dixon Crucible Company, Jersey City, N. J.

**3. Less zinc loss.**

There is probably no other question in brass making which has been discussed more, and on which more misinformation and misconception of the real facts is prevalent. The facts in the matter are that Copper melts at 1083 deg. C. and zinc boils at 980 deg. C., therefore, if we melt copper and add zinc to it some of the zinc will boil out until the alloy has cooled below the boiling point of zinc, when some zinc will still vaporize but to nothing like the extent it did when first put in. Yellow brass is usually poured at about the melting point of copper, i. e., 1050 C. to 1100 C., which is 150 to 200 C. above its melting point, 875 C. If, say, 120 lbs. copper is melted and brought to a temperature of about 1150 C. and then 60 to 80 lbs. of zinc added to it, there will at first be a rapid ebullition of zinc and the loss would run high, about 3% or 4% of the total weight of metal. On the other hand if 150 lbs. of brass scrap is melted, 25 lbs. copper added to it and "dissolved" in the bath and finally 20 lbs. zinc added, the loss should not exceed 1% to 1.5%. Under these conditions the temperature would never at any time go much over the boiling point of zinc.

Zinc loss, then, may be said to be a function of the temperature and the time the metal is held at that temperature.

The composition of the furnace gases, area of the surface of the metal, etc., have no influence. Other theoretical factors bearing on the volatilization of zinc are: the fact that a volatile liquid in solution in another non-volatile liquid has its vapor-pressure for any given temperature lowered roughly in proportion to the amount of the non-volatile solvent present. In other words it is probable that the boiling point of zinc is higher when dissolved in copper. It is a matter of common observation that brass scrap melted in the crucible loses very little zinc by volatilization as is evidenced by the lack of smoke over the pot. It is only when the metal is up to pouring heat and more zinc added that any volume of zinc smoke is observed. By melting brass in a closed chamber so as to increase the vapor pressure of zinc over the surface of the metal, it is probable that the boiling point of the zinc is appreciably raised. Electric furnaces can be thus sealed up, but unless some arrangement for distillation of the zinc were attempted, it is hard to see where such a procedure would be of any benefit because as soon as the furnace was opened to pour and the vapor pressure thus suddenly reduced, rapid ebullition of zinc would result and all the advantage lost, besides possible bad effects on the casting.

In view of these facts, therefore, the claim that the reduction of zinc losses is an inherent feature of electric furnaces is open to considerable doubt. It seems likely that better results are being obtained with electric furnaces than before but such results are largely due to more care being used, better grade of labor and most important of all, more rapid melting and casting than was possible with the coal pit fires. Figures on zinc losses are valueless unless they include this information:

1. Time study of the melting and casting operations.
2. Composition and full details as to the size, weight and nature of the metals and scrap used.
3. Actual weights of the different metals used, analysis of the scrap and analysis of the finished casting.

**4. Lower labor cost.**

This is a feature which is perhaps more interesting to the trade to-day than any other. The question of labor cost in melting is very simple. It takes more labor to operate 10 units of 200 lbs. capacity each than it does 1 unit of 2000 lbs. capacity, and if sufficient flexibility, control and quality is obtained by melting in 2000 lb. lots then so much the better and that is what should be done. The fuel and furnace to use, either for a 200-lb. charge or a 2000 lb. charge depend altogether on the local conditions and metallurgical requirements. In general the operation of coal fired pit crucible furnaces entails a great deal of hard labor. This can be overcome by a "liquid fuel" such as oil, producer gas or even city gas for small installations. If large production and 24 hour operation is required a producer gas plant and a regenerative furnace is to be considered. Such an installation offers great possibilities in economy and flexibility. The induction type electric furnace under similar conditions is also a feasible and economical proposition but does not afford the same flexibility. The principle of a "multi-crucible" chamber furnace with regenerative firing is used in Europe but does not seem to have received sufficient consideration in this country.

The crucible process entails very little labor except for firing the furnaces, necessitating shoveling coal, cleaning out ashes, punching out grate bars, etc. Remove this feature and there is a 50% reduction in the labor cost.

**5. Better metal than by any other method of melting.**

All that can be said on this subject is that the published data cannot be admitted as evidence consisting as it does of mere expression of opinion and assertion and in the absence of any published results of investigations made. There is no metallurgical reason why better brass should be produced by an electric furnace as against the crucible, or vice-versa, or by the crucible against the tilting or reverberatory or vice-versa. It is a question of proper operation of the furnace, skill and experience of the caster, proper preparation of the molds, etc., rather than any inherent characteristics of the furnace or fuel, that govern the quality of the metal.

In conclusion, I quote from two recent articles some remarks which should be carefully considered by the prospective purchaser of melting equipment:

(L. J. Krom, THE METAL INDUSTRY, May, 1919, p. 220.)

" . . . . One large electric furnace manufacturer gives out cost of operation figures by which he claims to melt metal for $8.50 per ton as against a cost of $13.50 per ton for the open flame oil furnace and $19.50 per ton for coke fired pit crucible furnace. He shows a zinc melting loss of 5% for oil and 3% for coke, with a corresponding cost, with zinc at 10c. per lb., of $10.00 per ton for oil and $6.00 per ton for coke. These figures are undoubtedly too high, as careful melting in both cases can cut them down materially.

"He also figures 1,200 lbs. of coke used at $9.00 per ton for melting a ton of ordinary brass. This is also too high, for any good melter will be able to maintain an average of between 500 and 600 lbs. of coke consumption per ton of brass melted. Again he assumes that crucibles will give 15 heats, whereas our crucible manufacturers would hang their heads in shame if their crucibles did not now run close to 30 heats. He puts the cost of electrical energy at 1½c. per kilowatt hour, whereas it costs 2 and 2½c. in a good many places.

"We are criticising these figures merely to show how important it is to investigate thoroughly into every phase of the subject before investing one's money."

(C. H. Clamer of the Ajax Metal Co., one of the pioneers in Electric Furnace melting of non-ferrous metals, in a paper read to the Phila. Foundrymen's Assoc.)

" . . . . there is no single type of furnace best suited to all conditions. A furnace suitable for one alloy or for large units may be unsatisfactory for another alloy or for small units. Continuous melting may mean all the difference between profitable and unprofitable working. Flexibility in working may be lacking in a furnace thus placing it at a disadvantage in competition with the crucible furnace. Caution is therefore urged in selecting furnaces for melting non-ferrous metals."

# EDITORIAL

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# THE METAL INDUSTRY

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## PRACTICAL EDUCATION

In this hypercritical period of discontent and dissatisfaction with everything from railroad service to the Presidential candidates, it is a genuine pleasure to be able to say whole-heartedly, about something, "That's good." However carping and critical an editor may be, it will be difficult for him to find any cause for complaint in the various projects for educating workers. The Summer Forum to educate employees in business principles to be organized in a number of plants this summer by the Business Training Corporation of New York, is one of these. It seems to be a genuine attempt to help to eliminate misunderstandings between the rank and file workers and the management, by educating the workers to understand the problems and difficulties of the "bosses."

The interesting feature of this Forum is that it is not a gathering of foremen and executives to learn how to produce more. It is a gathering of workers (and we hope, not only the best, but as nearly as possible all of them), to teach them how increased production will add to their own income. There is the opportunity to arrive at a truer conception of the difficulties of industry on both sides, a large part of which are brought about by lack of understanding. To be sure, much of this lack of understanding is the result of the old policy of secrecy and distrust.

This, however, is only one of the educational movements in progress today. The Bureau of Naturalization, Washington, D. C., is taking active measures to bring about the Americanization of foreign born workers. The National Safety Council, of Chicago, besides its regular work of teaching accident-prevention, is doing all in its power to better industrial relations. The Elliott Service Company, New York City, is distributing pictorial bulletins for the instruction of workers, and particularly the foreign born who speak no English, but must get their ideas from pictures.

The old ideas of indifference are surely dying. Management and capital realize that labor is an entity and must be reckoned with. The old system of herding "hunkies" together in unpleasant working conditions and unhappy home surroundings, paying them as little as possible, and giving them no further thought, made them a fertile field for radical propagandists. The country realizes now and regrets its former negligence. Such agencies as those mentioned are weapons against not only the radical propagandists, but the causes and conditions which permitted them to work.

## TRAINED MEN

It is quite natural that among the earliest claims of the exponents of new appliances or machinery is that of decreased labor cost. Very often this claim takes

extravagant forms, such as "A Child Can Run It," or "No Skill Required." No field is free from its friends who are overenthusiastic and who do it more harm than good, and it does not discredit electric furnaces in the least that they should have suffered from the same misfortune. It is decidedly reassuring, however, to see that the authorized representative of the electric furnace industry, the Electric Furnace Association, Niagara Falls, N. Y., has taken an honest, open stand in the matter. In their booklet, "Training Men," they come out squarely for skilled, intelligent operators, even technical men, to run electric furnaces. Such men as Jesse L. Jones, Prof. Joseph W. Richards, F. J. Ryan, Acheson Smith and others, unite in calling for men of ability for such work.

The best way of giving men this training was a question that resulted in much difference of opinion. However, it seems to us less important than the point (seemingly admitted), that capable men are necessary. If necessary, they will be obtained and given the proper schooling for this work.

As for the effect of such a decision upon the popularity of electric furnaces, there is little to fear. A machine stands or falls on its work, largely. If good men are used, they will turn out good work, and save the furnaces the black eye they might receive from having poor work turned out by incompetents. The claim still stands so far as we know, that electric furnaces have cut down the supply of unskilled labor necessary.

## AN EDITOR'S CREED

It sometimes becomes necessary to explain just what we are driving at. It is often helpful to show our indulgent readers just what we should like to be and do, if we could. We are not perfect; we miss our mark often. It is easy to criticize, and when one has the power to criticize in print, one grows, sometimes dangerously bold. It is no small temptation to hit at heads because we do not like them, instead of waiting for facts to back up our prejudices.

Nevertheless, we strive. And even in the heat of a July day, we try to curb our natural tendency to "tell the world" how badly it is running itself and how well we could do it if we were not so busy. Besides, it really is too hot. Our aim and ambition has, however, been very well phrased for us by the Editorial Conference of the New York Business Publishers' Association, Inc. When we fall short, please bear in mind that it is human frailty. Our objects are always these:

1. To consider first the interest of the subscriber.

2. To subscribe to and work for truth and honesty in all departments.

3. To publish in an impartial way, free from personal opinion, the news of the industry in which the paper circulates.

4. To refuse to publish "puffs," free reading notices or paid "write-ups," and to keep his reading columns independent of advertising considerations.

5. To be a leader of thought in his editorial columns and to make his criticisms constructive, with the object of bringing his industry to higher levels of thought and practice and to a greater measure of public service.

6. To support in his columns such worthy measures of public interest as their importance justifies and the space available permits.

7. To give proper credit for articles taken from other publications, and to avoid unfair practices in competition with them.

## THE YACHT RACES

The coming yacht races stand out as one of the foremost sporting events of years. It is most interesting and even puzzling to see how deeply interested the country becomes in the races between two specially built and, for practical purposes, almost useless vessels. In addition, the average person is densely ignorant about yachting, and a technical description of the construction of the boats and the handling of the vessels during their races must mean almost nothing to them. Nevertheless, they read these descriptions avidly.

We admit frankly, as stated in our article on page 312 of this issue, that we are in the same position. Our interest lies in the fact that it is our country against another, and moreover that it touches our field very closely. The Resolute, the American boat, is built largely of metal. The Shamrock IV almost entirely of wood. Quite naturally such a contest appeals to us, as it must appeal to all who are interested in metals. As to crediting or blaming the construction for the results of the race, we are not foolhardy enough to attempt such a prediction. We hope the better boat wins, but we hope it will be ours.

## THE ELECTRO-PLATERS' CONVENTION

The 8th annual convention of the American Electro-Platers' Society has been held in Rochester with even more than customary enthusiasm and success. Platers from all over the country have met, shaken hands, swapped stories and talked over their problems. It is impossible to overestimate the benefits derived from such meetings. We know of nothing more inspiring than the growth of the Society, a Society of men who formerly were considered skilled laborers, but who have through their own efforts risen out of this class and are making themselves trained technical men. Their meetings are a revelation to one who has not grown accustomed to them. Here are men who have started at the bottom, who have worked and are working conscientiously and with all the energy in their power to better themselves and their profession, not by force, but by educating themselves and their brother workers. They stand as a shining example of ambition honestly and straightforwardly applied. More power to them!

# CORRESPONDENCE AND DISCUSSION

**While we cordially invite criticisms and expressions of opinion in these columns, THE METAL INDUSTRY assumes no responsibility for statements made therein.**

## BUYING WHITE METAL

To the Editor of THE METAL INDUSTRY:

The writer has read with a great deal of interest your June editorial on Buying White Metals. Unfortunately I have not seen Mr. Hood's paper read before the Automotive Service Association.

In this connection one fact stands out clearly and beyond question: There are many manufacturers of Babbitt metal in the United States who will make no misrepresentation as regards the class of materials that they are using, nor will they in any way shade or change specifications which they receive for making Babbitts; and Babbitts that they make will receive full time in alloying and will be properly fluxed.

Any argument that the white metal alloyers as a class will give better attention to alloying and fluxing, or will use a better grade of raw materials for the manufacture of their special brand babbitts as against specification babbitts—is not founded on fact. If there be such a manufacturer he is the exception and not the rule.

Micro photography is coming into general use for the examination of many metals, and should be used for white metal alloys. To anyone who can read a micro-photograph there is no trouble to tell whether the proper raw materials were used or no, and whether they were properly mixed and fluxed. Large consumers are now coming to realize that the micro-photographing of their metals is as important as chemical analysis.

It is true that where there are hundreds of small junk shops making white metal alloys, there must creep in inferior qualities of raw materials and poor alloying, but when the buyer gets these poor alloys he has only himself to blame. When buyers of some of our large railroads ask "For how much less than the cost of raw metals will you supply mixed babbitt, solder, etc.," what can they expect to get?

The trouble with the metal business is "price-buying." Quality costs money. Quality must be paid for whether that quality is a special brand or to the buyer's specifications, and until the buyer realizes that he cannot buy gold dollars for 90c. so long will there be abuses in connection with any material manufactured, especially in the matter of substitutions, or savings made at the cost of quality and in the processes of manufacture.

Caveat Emptor, no more applies to the legitimate first class metal alloyer than it does to the first class manufacturer in any other standard line. Good qualities can only be made when people are prepared to pay a fair cost plus a fair profit to the maker, and the office of this association is at all times prepared to put any legitimate inquiry before manufacturers who can be absolutely relied upon to furnish just what is specified by the buyer, properly refined and processed to just the quality the buyer desires.

Yours very respectfully,

June 14, 1920. A. COCHRAN, Secretary,
Solder and Bearing Manufacturers' Association,
233 Broadway, New York City.

## ABRASIVES

To the Editor of THE METAL INDUSTRY:

We have read with interest P. W. Blair's article in THE METAL INDUSTRY for June entitled "Abrasive Paper and Cloth." The writer has been engaged in the abrasive industry for the past 23 years and believes you will be interested in one or two corrections.

Emery has not been mined at Chester for many years, although a very good trade was obtained there 10 or 15 years ago, but so far as known this deposit is entirely exhausted.

Your article indicates a difference between carborundum and crystolon, particularly in the temperature at which it is produced. These two abrasives are identical except in name. They are made under exactly the same conditions by two different companies, each of which uses its own trade name.

You state there are other abrasives manufactured along the same lines to take the place of Turkish emery, namely, carbonite, aloxite, adamite, etc. Outside of the two abrasives above referred to there are only five artificial abrasives manufactured in this country, namely, carbolon, which is the same as carborundum and crystolon, alundum, aloxite, lionite and natite. The four last named are all aluminous abrasives and do not at all resemble carborundum. Several of those named in your list are merely private brand names, thus: Rex is the name under which one company sells lionite.

We regret to notice that you did not see fit to mention lionite at all in your article. About 90 per cent. of the grinding wheel makers are now using lionite in the manufacture of grinding wheels and about 60 per cent. of the abrasive paper and cloth companies are using lionite for their products. In addition it is widely used in the polishing trade in the grain form. As we have been advertising in THE METAL INDUSTRY for a good while and as there is only one other manufacturer of artificial corundum which does this we scarcely see how you happened to overlook us.

Yours very truly,

June 14, :1920. H. A. RICHMOND, Treasurer.
Niagara Falls, N. Y. General Abrasive Company, Inc.

To the Editor of THE METAL INDUSTRY:

In response to Mr. H. A. Richmond, of the General Abrasive Company, Niagara Falls, N. Y., I know of the Lionite brand, but there are so many names which different dealers adopt that I overlooked this particular one. Lionite is used to my knowledge by a large percentage of grinding wheel manufacturers and abrasive cloth companies for the polishing trade.

PETER W. BLAIR.

Montreal, Canada, July 1, 1920.

## PROTECTING AUTOMOBILE PARTS

To the Editor of THE METAL INDUSTRY:

The writer has read with interest the article written by Mr. Proctor on "The Protection of Automobile Parts," and agrees with him on the necessity of some method of protection, but not on the method.

Having had a wide practical experience in nickel, copper and zinc plating, and being at present in charge of the largest polishing and buffing department in the country, working exclusively on sherardizing, I feel at liberty to take exception to several statements which Mr. Proctor has made.

The statement that the high heat of sherardizing is injurious to the metal indicates the fact that Mr. Proctor is not familiar with the Electro-Sherardizing process developed by the General Electric Company. This is a low heat, high metallic method in which a maximum of 625 F. is used, the heat being generated by electricity in order to maintain perfect temperature control. Any practical automobile metallurgist will agree with the statement that 625 F. will not injure any steel used in automobile work with the exception of carbonized pieves and these need not be considered as they are invariably wearing parts, working in the presence of oil and grease.

The writer is familiar with the proceedings of the conference at the Bureau of Standards and their decision that zinc coating is the most efficient method of protection against atmospheric corrosion, but Mr. Proctor has evidently not read the report of tests made by the bureau, published in Chemical and Metallurgical Engineering of May 1 and 15, 1919, when he makes the statement that zinc slating applies an evenly distributed coating.

This report illustrates very clearly the unevenness of coating by the zinc plating process, and shows both in theory and by illustration how impossible it is to obtain an even coating by this method. The deposit is heavy on high spots and light in depressions, and is especially true on threaded parts, where the coating is heavy at the top and very light at the root of the thread.

The writer believes from practical experience with both zinc plating and Electro Sherardizing that the advantages are all in favor of the latter process. The Electro Sherardizing coating, being an impregnation as well as a coating, will not peel and does not need the expensive cleaning which is a requirement of successful zinc plating, furthermore, I question whether a deposit of over .001 is practical with zinc plating, while a deposit

of .002" to .0025" is obtained by Electro-Sherardizing. This is particularly important on buffed work as our experiments have demonstrated that buffing zinc removes from .0005" to .001", leaving a very substantial coating on Electro-Sherardizing, but not on zinc plating. This is especially true on sharp corners where the buffing strikes the hardest.

The Electro-Sherardizing process also permits a big saving in polishing, as the heavy coating of zinc fills the wheel marks to such an extent that a one-wheel 120-emery finish gives a result equal to from two to four wheels on plating work.

The ease of cleaning holds true of the Electro-Sherardized as well as of the zinc plated coating inasmuch as they are both pure metallic zinc, and all my statements are proven on the thousands of parts which are passing through my department daily.

Yours very truly,

June 21, 1920. A. L. BURROWS,

Wise Electro-Sherardizing Company, Detroit, Mich.

To the Editor of THE METAL INDUSTRY:

I have read with interest the above letter from Mr. A. L. Burrows of the Wise Electro Sherardizing Company, Detroit, Mich., in which he criticizes my article, "The Production of Automobile Parts from Corrosion," and desire to thank him for his comments. Mr. Burrows lays considerable emphasis on the Wise Electro Sherardizing process. Why the term electro sherardizing? The term is misleading in the writer's opinion. No better results as far as the zinc deposit is concerned is obtained from electro heating than with any other method of heating, presuming the vaporizing temperature of 625 degrees Fahr. is practically controlled with up-to-date pyrometers. Why or how is the Wise method any better or superior to the usual method of sherardizing as developed and patented by Cowper-Cowles?

Sherardizing is an efficient method, gives a uniform coating and is no doubt adapted for many articles where the other methods of hot galvanizing, electro-galvanizing acid solution would not give such a uniform coating of zinc. However, it has been found in practice that the alkaline solution, properly prepared and electrically controlled, does give a uniform deposit.

Mr. Burrows seems to have the idea that all I read is THE METAL INDUSTRY, but to prove that once in a while I do read other publications, I shall extract from a reprint from Chemical and Metallurgical Engineering entitled "Metallic Coating for Rust-Proofing Iron and Steel." Mr. Burrows states that evidently I have not read the report, but as he presumably used the reprint as his authority I shall do the same, covering my contentions in my article as noted.

ADVANTAGES AND DISADVANTAGES OF EACH TYPE.

Page 3.—Sherardizing has the advantage of giving very even coatings. The coating on a screw thread, for example, will show no appreciable variation from the top to the root of the thread. On the other hand, sherardizing is a slower process, and **it cannot be used on such hardened steels as would be softened too much by heating at 375 deg. C. for 3 to 4 hours. Neither is the method suited to handling large sheets, etc.** Furthermore, the quality of coating produced by this method is greatly modified by the conditions of operation, such as purity of the zinc dust, uniformity of heating, duration of treatment, so that widely different results are obtained in practice.

Electroplating has the advantage of being readily applied to small and delicate articles that are not easily handled in other ways, and the obvious advantage that it can be applied to steel without modifying any previous heat treatment. One advantage of this process is the ease of operation; there are several devices now upon the market by means of which the operation (including the preliminary cleaning and final washing) can be made a continuous one requiring but little supervision. Another distinct advantage of electroplating is the ease of control of the thickness of the deposit—within rather wide limits this is directly proportional to the period of deposition. On parts having sharp corners or depressions, however, it is apt to give uneven coatings. On threads, for example, there will be an accumulation of zinc at the top of the thread, while the root may be nearly bare, and even on flat plates it has been found that the coating is heavier at the edges than in the center. **It seems probable, however, from some recent work done by this Bureau, that such differences are much less pronounced in zinc deposited from the cyanide solution than in that from the sulphate bath.**

RECOMMENDATIONS CONCERNING COATINGS

Page 8.—Of the different types of zinc coatings the "hot-dipped" and sherardized are not to be recommended for hardened and tempered steels (springs, etc.); the plated zinc and the sherardized coatings are both recommended for accurately machined parts; threaded portions, however, are best coated by sherardizing; the "spray" coatings are valuable for large or complex parts which must be coated "in situ" after assembling.

VARIATIONS IN MICROSTRUCTURE OF COMMERCIAL COATINGS

Page 10.—The nature and composition of zinc-dust mixtures in which the articles are packed for heating probably determines almost entirely the nature of the outer layer; in the innermost layers alloying with the iron base occurs. The outer portions have a characteristic rough and porous appearance and contain a considerable number of inclusions of oxide and foreign ingredients which may be present in the heating mixture.

The inner portion of this outer layer is much denser than that near the outer surface and has a very characteristic appearance, being broken up by many fine intersecting cracks, caused probably by contraction upon cooling. The layer probably contains a considerable amount of the compound FeZn. The intermediate layer, which easily etches dark, in all probability marks the outer limit of the pronounced alloying of the iron of the base with the zinc of the coating. An extremely thin layer immediately adjacent to the iron base, and apparently of the compound $FeZn_7$, marks the union of the coating with the base metal. In none except very thick ones, e. g., 0.008 in., are these two innermost layers found; when much thinner, e. g., 0.002 in. or 0.0015 in., the coating consists entirely of what, in the thicker ones, constitutes the outer layer.

PLATED ZINC COATINGS

Page 11.—As is to be expected from the nature of the process by which such coatings are deposited, they are essentially of pure zinc and show none of the different alloy layers seen in the first two types.

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Mr. Burrows contends that a pure coating of zinc is obtained from the Wise method of sherardizing. Why is it then that sherardized coatings rust more quickly than deposits of an equal thickness produced from an efficient electro-zinc plating solution. Is it due to the alloy of FeZn in the deposit? Furthermore, I know a number of concerns who gave up sherardizing because of the dark lead color; also, when a polished finish was desired, nearly all the zinc surface was rubbed off in producing the desired surface.

As to the reasons why sherardizing is not more universally used, Mr. Burrows will see them when he re-reads the abstracts as above given.

I trust this letter will explain in detail my contentions. No further response will be made.

NEW YORK, June 28, 1920. CHARLES H. PROCTOR.

## THE METRIC SYSTEM

**We print below two letters from men, prominent in the brass trade, to the editor of the organ of the American Institute of Weights and Measures. We should be very glad to hear from others in our field.—Editor.**

To the Editor:

Our business is insulating wires and cables and we feel that it would be a mistake to change over to the metric system. We have had this matter up with our various factory officials and they are not in favor of discontinuing the present English system of weights and measures. We divide inches into decimal fractions and in weighing wire we have been dividing pounds into decimals also, having abandoned the division by ounces about fifteen years ago. All our tools, jigs, blue prints, etc., are based on the English system, divided into decimal fractions, and we can see no object in changing to the metric system. It would mean a very heavy expense with us and would considerably increase the liability of error. Copper wire, which is the base of our products, is measured according to the Brown & Sharpe gauge, but we sometimes execute orders for metric sizes but always reckon them by the equivalent decimal fraction of an inch.

(Signed) J. P. DAVIS,
Assistant to the President,
Belden Manufacturing Co.
Chicago, Ill.

To the Editor:

We are very much opposed to the changing over from the English to the Metric System because we believe it will result in serious confusion, and we appreciate that such a change would not only be great expense to us but immense expense to many of our friends. To the scientific mind in general, the metric system seems to be very simple and easy to apply, but, as a matter of fact, we are used to dealing in common fractions rather than decimals and even in money, we divide the dollar into halfs and quarters as we do the inches in our standards of measurements. Apparently, the only object in changing to metric system is to get into line with France and Germany and this means, of course, getting out of line with England. We are inclined to the belief that we had better keep on with our own system and let the foreign people take care of themselves. When it becomes necessary to make material for shipment in the metric system, it is always possible to work accordingly. There is not enough business requiring the metric system measurements to encourage a change.

(Signed) W. H. BASSETT,
Technical Superintendent and Metallurgist,
American Brass Co.,
Waterbury, Conn.

## ADEQUATE COAL SUPPLY

**We have received a copy of the following letter from the National Association of Purchasing Agents to the Interstate Commerce Commission, which will interest manufacturers of metals and metal goods.—Ed.**

INTERSTATE COMMERCE COMMISSION,
Washington, D. C.

GENTLEMEN:—In presenting the following recommendations to your Commission, it may be pointed out that the membership of this association comprises 3,500 purchasing agents for manufacturing concerns in all fields of industry.

The effect upon general industry or existing conditions in the bituminous coal field is typified by the experience of the concerns represented in our membership, which may fairly be said to be thoroughly representative of American industry. One of the most important duties devolving upon our members is the purchase of fuel for the operation of their respective plants. The critical conditions in the bituminous coal field with the logical assumption that the conditions are likely to become worse in the closing months of the year, inspire us to go on record as favoring the establishment of regulations which will alleviate the insufferable conditions imposed upon the industrial purchaser of coal and will tend to minimize and apportion equally the burdens resulting from the lack of production and consequent inadequate supply of bituminous coal.

The recommendations presented herewith are the formulated opinions of our members in all manufacturing fields and all coal consuming districts. They are based on a sincere desire to secure for our industries no especial privileges, but rather protection against discriminatory practices which serve to cause plant shutdowns for lack of fuel and to give rise to questionable practices in the sale and purchase of the limited supply of coal available.

First, we desire to record our firm conviction that the re-establishment of the "assigned car" principle is detrimental to the interests of the national industries. Unquestionably, it is to the advantage of the railroads to possess the power of preferentially assigning coal cars to mines, the output of which is wholly or partially taken by the railroads, but it is unfair to the balance of industry. In effect, the practice insures the railroads a full supply of fuel at prices virtually of their own making. It obliges industrial consumers to bear the burden of tremendously increased prices for the wholly inadequate remainder of the coal supply. It obliges operators who must depend upon unassigned cars to assume a disproportionate overhead expense which is logically passed along to the industrial consumer.

President Wilson, in his order of May 25, 1919, stated: "Under the present war demands the maximum output of every mine working at full speed would be insufficient to meet the country's coal needs. The principle of equal car supply has accordingly been adopted so as to make for as steady an operation as possible of all properties and for continuous employment of men, thus making for maximum output."

We submit that deleting the single word "war" from the first sentence of the President's order makes it equally applicable to the conditions of the present time. We therefore petition your commission to abolish the preferential use or assigning of coal cars for the railroads or any other privileged industry.

Second, we desire to go on record as favoring the abolition, if possible, or at least the establishment of definitely prescribed regulations against the common and greatly abused practice of the railroads in confiscating coal consigned to industrial users. In the report of the Award and Recommendations of the United States Bituminous Coal Commission, it is pointed out that the railroads to a great extent depend on "a practice that has grown up of protecting themselves in the winter months by commandeering coal consigned to other consumers." We record our earnest conviction that the railroads should be prohibited from following this practice except in cases of thoroughly defined emergency. Under any rulings or regulations which may be issued to limit this abuse, there should be clearly established the right of the original consignee to recover from the railroad an equal amount of coal of equal quality to replace that confiscated, or the recovery of the amount which the consumer may be forced to pay to secure a replacement of the coal.

Third, in view of the present inadequate production of bituminous coal and the consequent scarcity of supplies stored by industrial concerns, we desire to record our conviction that there should be established embargo regulations against the exportation of coal until such time as domestic requirements are adequately met.

Yours very truly,
D. E. FERGUSON,
Chairman Legislative Committee,
National Association of Purchasing Agents.

New York, June 28, 1920.

## NEW BOOKS

**Electro-Deposition of Metals, by Dr. George Langbein, translated with additions by William T. Brannt. Size 5¾ x 9 inches. Cloth binding. Price payable in advance $7.50.**

The 8th edition of this book long overdue has at last been published. We quote from our review in the February issue, on page 89.

The new edition has been completely revised, enlarged and brought up to date, and considerable new text matter and many engravings have been added. It is the foremost work in the English language treating on the subject and covers the most recent innovations and apparatus.

The interest of most readers will doubtless center in the main division of the volume, the practical part, which presents the industry in all its aspects, from the arrangement of electroplating establishments to actual methods used in the deposition of various metals. It is here that the plater finds a treasury of practice that he may turn to direct account in his business.

The book, which has been entirely reset, contains 850 octavo pages and 185 engravings.

## CORROSION

**Summary of Fifth Report to the Corrosion Committee of the Institute of Metals by Guy D. Bengough, M. A., D. Sc., R. M. Jones, M. Sc., and Ruth Pirret, B. Sc., presented at the Annual General Meeting of the Institute of Metals, held in London, on Thursday, March 11, 1920.**

## THE VOLUME-MOISTURE RELATION IN SAND AND A METHOD OF DETERMINING SURFACE AREA BASED THEREON

**An Abstract of a Paper Presented Before the American Society for Testing Materials at the Twenty-third Annual Meeting, to be held at Asbury Park, N. J., June 22-25, by RODERICK B. YOUNG and W. D. WALCOTT.**

The experiments here described have shown that the maximum increase in volume of any sand resulting from addition of water—here called maximum bulking—is, within certain limits, a direct function of the surface area of that sand as determined by the methods used by Edwards in his original studies.

The limits within which this relation holds are approximately the limits of surface area encountered in commercial concrete sands.

# SHOP PROBLEMS

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE

ASSOCIATE EDITORS { JESSE L. JONES, Metallurgical; WILLIAM J. REARDON, Foundry; PETER W. BLAIR, Mechanical; LOUIS J. KROM, Rolling Mill; CHARLES H. PROCTOR, Plating-Chemical; CORYDEN P. KARR, Exchange-Research

## ACID CONCENTRATION

Q.—Can you tell me the percentage of H.Cl. gas in the common muriatic acid? The carboys are marked 18° and 107. Can you tell me where I can get tables that will give the sp. gr., Be.° and percentages of nitric, sulphuric and muriatic acids?

A.—You state that your carboys are marked 18° and 107. It is hard for us to understand what the 107 means. The most likely explanation would, of course, be specific gravity, but in that case it does not check with the acid tables, according to the Handbook of Chemistry and Physics, issued by the Chemical Rubber Company, of Cleveland, Ohio, from which we get our imformation.

Hydrochloric acid of the specific gravity 107 has a density of 9.4° Be., and hydrochloric acid, which has a density of 18° Be., has a specific gravity of 1.1425; these figures at 60° Fahr. The percentage of H.Cl. in the 107 solution is 14.174. The percentage of H.Cl. in the 18° Be. solution is 28,144.—A. B. Problem 2,836.

## BLACK PLATING SOLUTION

Q.—I am sending you a sample of a solution I found when I took charge of this place a year ago. It is used for black on brass and has steel anodes; used only about once in six months for a small quantity of work, and plates the best with three and a half volts. If it were not for the steel work being brass plated, I could use saturated carbonate of copper solution for dipping, but it does not work well on brass-plated steel. Black nickel would answer the purpose, but the work is relieved and sand blasted. Black nickel does not stand up well against sand blast.

I know numbers of blacks, but they would not admit water. As this is a cheap line of work, there would be too much expense to clean and dry it and then deposit it in the solution.

When I came to this place, I found this little one-hundred-gallon tank three-quarters full, with steel anodes. I asked one of the men what they used it for, and he said that it didn't work very well, but it was black nickel. Now I do not know of any black nickel where steel anodes are used, so I filled it up with water and it worked fine. If you can tell me what you think it is, or if you have another formula that would answer the purpose, I would be very thankful to you.

A.—If you had made a litmus-paper test of your black plating solution it would have been much easier to decide just what type of solution you have. Acid solutions turn blue litmus paper red. Alkaline solutions turn red litmus paper blue. It is possible that the solution is made up as follows:

| | |
|---|---|
| Water | 1 gallon |
| Caustic soda | 4 ounces |
| White arsenic | 3 ounces |
| Sodium cyanide | 1 ounce |

To prepare the solution dissolve the caustic soda and arsenic in a quart of warm water. Then add the balance of the water cold. Then add the sodium cyanide. The following solution also gives good results:

| | |
|---|---|
| Water | 1 gallon |
| Sodium cyanide | 1¼ ounces |
| Copper cyanide | 1 ounce |
| Sodium bicarbonate | ½ ounce |

When the dilute copper solution is prepared, add sodium arsenite, in small proportions, until a good gray-black is produced. Sodium arsenite may be prepared by dissolving 1 part caustic soda and 2 parts white arsenic, powdered, in as little warm water as possible for solution.

Iron, steel or carbon anodes may be used in the solutions given.

You can build up your present solution with sodium arsenite and a little sodium cyanide, providing it is an alkaline solution. Make a litmus paper test.—C. H. P. Problem 2,837.

## FLEXIBLE SHAFTS

Q.—Can you tell us whether flexible shafts are being used successfully and to what extent in polishing and finishing silverware with intricate parts which cannot readily be reached with a rigid buffing spindle?

A.—Flexible shafts are used extensively in emery grinding on machinery that has intricate parts. There is no reason why they cannot be used in polishing and finishing silverware with intricate parts which cannot be readily reached with a rigid buffing spindle.

The only question to be considered is one of speed of rotation so as to give sufficient rigidity to the buffs so they will stand up during the polishing operations. We have every reason to believe flexible shafts can be used successfully by you for the purpose outlined.—C. H. P. Problem 2,838.

## ETCHING GOLD AND SILVER

Q.—I do etching on silver, using a weak nitric acid solution and a slow current. Now we are going to etch gold frames and cases I use a strong cyanide solution, one pound to the gallon of water, and a slow current, which makes a fine mat. The only trouble I have is that the varnish peels and it works slowly. I use asphaltum turpentine varnish, which is very good on silver. Could you let me know of any varnish or paint that would hold better in the cyanide solution, or of any solution that would work better? I have tried 1 part of nitric and 3 parts of muriatic acid, but this leaves a rough mat and the varnish peels, also. We have some very delicate lines on our designs.

A.—As a rule asphaltum turpentine paints, when applied to metal as a resistor in plating or etching, give the best results either in alkaline or acid solutions. Egyptian asphaltum should be used. This material appears to have a greater resisting action than ordinary asphaltum.

You can prepare your own resistor by dissolving pure Egyptian asphaltum in pure spirits of turpentine. Use heat, such as a hot-water bath, in dissolving. The addition of a little gum mastic improves the combination. After preparing, strain the mixture through several thicknesses of cheese cloth to remove any particles of undissolved material. Thin afterwards as desired for use.

Two other good materials sold commercially are Resisto, sold by the Masury Paint Company, New York, and Mogul, manufactured by the Mogul Company, New York. Gum ginacum, or a mixture of this gum and copal, dissolved in acetine, make good resisting varnishes.

Whatever combination is used as a resistor, the material, when applied, should be thorough dried before immersed in any alkaline solution, or any acid applied in etching. The acid combinations you are now using as an electro-etching medium cannot be improved upon, except that the strength of the cyanide solution might be considerably reduced by using small proportions of potassium bichromate with the cyanide.

Try the following formula:

| | |
|---|---|
| Water | 1 gallon |
| Sodium cyanide | 6 ounces |
| Potassium bichromate | 1 ounce |

C. H. P. Problem 2,839

## CLEANING MIRRORS

Q.—There have come to my shop some old mirrors stained so badly that it is almost impossible to clean them by means of either nitric or hydrochloric acid, used even chemically pure. This happens especially with mirrors that have been made by the quicksilver or mercury process and then backed with tinfoil. It seems that after several years this amalgam holds so hard to the plate glass that it is impossible to get it entirely off by scraping or the use of the above-mentioned acids. Sometimes I have a very rough surface, something like a scale, on the plate. I do not know if the glass has been attacked by the quicksilver, or if it is only a matter of cleaning.

A.—As mercury is soluble in nitric acid, it would seem to us that if you prepared a solution of equal parts of nitric acid and water, by measure, and then heat the acid, say, to about 160° Fahr., and the glass to nearly the same temperature, and apply to the side that has been coated with the mercury amalgam, it

should entirely remove the mercury and any oxide that may have formed during the process of years.

After cleansing as outlined, wash thoroughly in water and immerse in a strong solution of sodium cyanide and water—

| | |
|---|---|
| Water | 1 gallon |
| Sodium cyanide | 6 to 8 ounces |

or apply the cyanide solution to the glass by the aid of a swab or small mop.

Other combinations that might be tried are:

| | |
|---|---|
| Hydrochloric acid | 12 ounces |
| Nitric acid | 4 ounces |
| Water | 1 gallon |

Temperature as outlined, or you can also try

| | |
|---|---|
| Hydrofluoric acid | 8 ounces |
| Water | 1 gallon |

This combination should be tried out if the cyanide solution does not remove the brownish oxide.—C. H. P. Problem 2,840.

## BRAZING

Q.—We are interested to know the best method of filling a V cut groove ¼ inch at top and ¼ inch deep cut in navel bronze. The V separates two plates, and must hold alternate steam and cold water pressure of about 30 pounds.

Any information that you can give me on this matter will be appreciated very much.

A.—The method used for brazing brass tubes would probably be very satisfactory for this job. Brazing solder of 40 mesh is mixed with about 10% of powdered borax glass. This mixture is made into a thick paste with water and filled into the groove from a small scoop. The articles are then passed continuously through the brazing furnace. The ordinary brazing solder consists of 50% copper and 50% zinc. It is quite brittle and while some of the zinc is volatilized in the brazing operation it may be desirable for the use you mention to reduce the zinc to 45% with 55% copper. This alloy has some ductility and its melting point is not much higher than the first named alloy.

Silver solder is the most satisfactory brazing solder for exceptional situations as it has the strength of mild steel and great ductility. If you only have a few pieces to braze and the cost is not a vital consideration, by all means use silver solder. For quantity production, however, the first described process should be tried.—J. L. J. Problem 2,841.

## AMALGAMATING SOLUTION

Q.—Can you send me a formula to make up a gallon of solution for amalgamating silver plates for a small battery? I would like to make up a solution to store away and avoid using the battery while amalgamating the plates.

A.—To prepare a gallon of amalgamating solution such as is used in amalgamating battery zincs, and will no doubt answer for silver plates used in a small battery, proceed as follows:

Mix two pounds of nitric acid and three pounds of muriatic acid and heat slowly. Now add slowly one pound metallic mercury. The manipulation should be done outdoors to avoid fumes. When the mercury is all dissolved, an additional amount of mixed acids should be made and added to the solution to make it equal one gallon.

To apply the amalgam immerse the plates in the amalgam, or brush on with a stiff brush.—C. H. P. Problem 2,842.

## CLEANING

Q.—I had a steel bottom welding done on my electro cleaning steel tank, and ever since I had a new bottom welded all my work comes out with a red film on my steel work and prevents the cleaning entirely. I use caustic soda for cleaning the steel parts. I never had any trouble with the steel tank until a new bottom was welded on.

A.—We are at a loss to understand the reason why you get a red film on your steel work, electro-cleansed in a caustic soda solution, even though you found it necessary to weld on a new bottom to your cleaning tank. It would indicate that some copper has got into the solution in some way. Was the bottom oxyacetylene welded, or was a brass solder used and the bottom brazed on?

In the latter case the red tone would result from the copper being reduced from the brass solder, the tank being the anode. However, caustic soda is not expensive. Make up a new solution and see if the results are not normal.

If you arrange a double throw switch on your tank, which is always advisable, the reversal of the current will immediately reduce the film, which is presumably an oxide of some form.

It is possible that the addition of ¼ ounce of sodium cyanide per gallon of cleaning solution will prevent the deposition of the film. Try it before discarding the solution.—C. H. P. Problem 2,843.

## OXIDIZING GILDING METAL

Q.—Will you please give us the formula for an oxidizing solution for oxidizing gilding metal? Gilding metal, as you know, is a special alloy made for hard enameling or, we believe, it is the same thing as commercial bronze. Our trouble has always been that we could not obtain an oxidization strong enough, nor at the same time make it stick, it seems to peal and chip even before it struck the wheel to be brushed.

A.—The oxidizing of gilding metal is a more difficult problem than with copper or brass, as you have learned.

The most satisfactory results are produced by electroplating in a black nickel solution or in a substitute black nickel solution, which produces a smut black.

A black nickel solution is prepared as follows:

| | | |
|---|---|---|
| Water | 1 gallon | |
| Double Nickel Salts | 6 ozs. | Part No. 1, in ⅔ hot water. |
| Single Nickel Salts | 1 oz. | |
| Sal Ammoniac | 1 oz. | |
| Sulphate Zinc | 1 oz. | Part No. 2, in the balance ⅓ hot water. |
| Sodium Sulpho Cyanide | 2½ ozs. | |

Mix No. 1 and No. 2. Use when cold with brass anodes and nickel. Voltage not to exceed one volt for intense black.

The substitute black nickel is prepared as follows: This formula gives a soft black smutty finish.

| | |
|---|---|
| Water | 1 gallon |
| Single Nickel Salts | 5 ozs. |
| Copper Sulphate | 2 " |
| 26% Aqua Ammonia | 6 " |
| Common Table Salt | 2 lbs. |

Mix thoroughly. Use at normal temperature with nickel anodes. Voltage 1 to 2.

To maintain add a little copper sulphate and ammonia at frequent intervals.

As an immersion dip which produces a gray black:

| | |
|---|---|
| Water | 1 gallon |
| Hyposulphite of Soda | 8 ozs. |
| Lead Acetate | 3 to 4 ozs. |

Temperature 180 to 212. Immerse articles for a few seconds until uniformly coated.—C. H. P. Problem 2,844.

## REMOVING SHERARDIZING

Q.—What advice can you give us on removing sherardizing from steel? We have a few sherardized parts that were a failure and on which we desire the coating removed so that the steel can be covered with nickel.

A.—If it is sherardizing that is really meant to be removed, that is if the articles have been treated in an atmosphere of zinc, in a heated drum, its entire removal will be impossible, because the zinc has penetrated into the steel, to a depth depending upon the length of the treatment. In such a case, only the surface zinc can be removed. Since acid would destroy the article, the best method to remove the zinc is with a hot sodium cyanide or hot sodium hydroxide solution. The time required may vary from one-half to several hours, depending upon the thickness of zinc coating. It is the only method by which zinc can be removed and the articles not damaged to the slightest extent. The more concentrated the solution, the more rapid the action. If such spoiled sherardized articles are a frequent occurrence, it is best to have a steel tank serving as a stripping tank, equipped with a steam coil to keep the solution always on hand. To prevent subsequent trouble in nickeling due to the zinc that has penetrated into the steel the articles should be first copper plated and then nickeled.

If only an ordinary galvanized or zinc plate is meant, then the entire zinc can be removed as stated above and the articles nickeled without previous copper plating.—J. H. Problem 2,845.

# PATENTS

## A REVIEW OF CURRENT PATENTS OF INTEREST

1,327,400. January 6, 1920. **Surface-Colored Article of Copper Alloy.** Thurston C. Merriman, of New Haven, Conn., assignor to Winchester Repeating Arms Co., of New Haven, Conn., a corporation.

This invention relates to an improved surface-colored copper alloy, the object being to produce for any available purpose, at a low cost for production, articles of copper alloy having a durable and handsome black, or substantially black, surface color.

With these ends in view this invention consists in a copper alloy containing arsenic, provided with a surface finish of black, or substantially black, color.

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1,326,971. January 6, 1920. **Method of Making Solder.** John Salm, of Albany, N. Y., assignor to Charles L. A. Whitney, of Albany, N. Y.

This invention relates to a new and useful improvement in solder and the method of making the same, and has for its object to produce a solder for use in uniting pieces of aluminum or aluminum alloy in a strong and durable manner.

This solder when produced contains tin, aluminum and zinc, over 50 per cent. of the solder being tin and the zinc being in excess of the aluminum. In the specimen hereinafter particularly referred to, the tin amounts to about 75 per cent., the zinc to about 16 per cent. and the aluminum to about 8 per cent., the zinc being thus about twice as much as the aluminum.

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1,327,743. January 13, 1920. **Process for Making Powdered or Granulated Aluminum.** Lewis B. Tebbetts, 2nd, of St. Louis, Missouri.

When a mass of aluminum is at a temperature slightly below its melting point, the mass becomes extremely brittle so that it may be crumbled or powdered with facility. The present process consists in bringing a mass of aluminum to this predetermined temperature and violently agitating the same while at this temperature. It is preferable to raise the temperature of a mass of aluminum to a point above six hundred, and fifty-five degrees centigrade, the melting point, and while the aluminum is in the molten state to initiate the agitation thereof by stirring or by other means, and permitting the metal to cool while the agitation continues. When the temperature reaches a point just below the melting point the mass will be broken into granules.

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1,329,322. January 27, 1920. **Making Powdered Metals and Reduced Metallic Compounds.** Carleton Ellis, of Montclair, N. J.

This invention relates to a method of producing metals or metal-containing substances in a finely-divided condition and relates especially to substances which are capable of being used as catalytic material, as for example nickel in a finely-divided form adapted for use in the hydrogenation of fatty oils.

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1,330,231. February 10, 1920. **Production of White Gold.** David Belais, of New York, N. Y.

This invention relates to the production of a substitute for platinum. The object of this invention is to produce a composition of matter known as white gold that will have the appearance of platinum and that may be used as a substitute for it, especially in the jewelry trade. It consists of the novel process and product herein described. In this improved process is taken gold, especially or preferably fine gold, nickel, preferably pure nickel, and zinc, preferably pure zinc, and fused together in a suitable crucible and thoroughly mixed together while they are thus fused. The resulting composition has the appearance of platinum and is adapted to be used as a substitute for it as already stated. It is ductile and malleable.

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1,331,919. February 24, 1920. **Method of Casting Metal Bars.** Carl G. Heiby, John Burkam, David E. Lindquist, Ebenezer W. Allen, Fred L. Riggin, and Richard Law, of Sarnia, Canada, assignors, by mesne assignments, to Mueller Metals Company, of Port Huron, Mich., a corporation of Michigan.

The present invention relates to new and improved methods of an apparatus for casting, more particularly the casting of stock for use in drop forging.

Stock for forging must be free from faults, such as blow-holes, pipes, and dross fillings, for the reason that not only will such faults appear under the action of the press, but also where such forgings are afterward machined sub-surface faults may be developed.

By practising the method and using the apparatus herein disclosed it is possible to produce stock free from the faults named, and equal to the rolled stock, expeditiously and cheaply, so that finished articles may be turned out in large numbers and at a relatively low cost, with practically no loss from rejected stock or finished goods.

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1,332,160. February 24, 1920. **Solder Flux.** Charles Leslie Bonsteel, Moose Jaw, Saskatchewan, Canada.

The object of this invention is to produce a flux which will render possible the soldering of iron or steel surfaces and which may also be used with galvanized, plated or tinned surfaces.

The mixture of ingredients which have been found in practical application to effect the desired result of fluxing soft solder to iron or steel surfaces comprises the following, in or about the proportions named:

| | |
|---|---|
| Ox lard | 40 parts |
| Resin | 40 " |
| Sesame | 20 " |
| Zinc chloride | 12 " |
| Water | 12 " |

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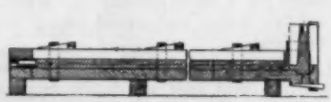
1,331,920. February 24, 1920. **Mold for Casting Metal Bars.** Carl G. Heiby, John Burkam, David E. Lindquist, Fred L. Riggin, Ebenezer W. Allen, and Richard Law, of Sarnia, Canada, assignors by mesne assignments, to Mueller Metals Company, of Port Huron, Mich., a corporation of Michigan.



The present invention relates to new and improved apparatus for casting, more particularly the casting of stock for use in drop forging. Stock for forging must be free from faults, such as blow-holes, pipes, and dross fillings, for the reason that not only will such faults appear under the action of the press, but also when such forgings are afterward machined sub-surface faults may be developed.

With the apparatus herein disclosed it is possible to produce stock free from the faults named, and equal to the rolled stock, expeditiously and cheaply, so that finished articles may be turned out in large numbers and at a relatively low cost, with practically no loss from rejected stock or finished goods.

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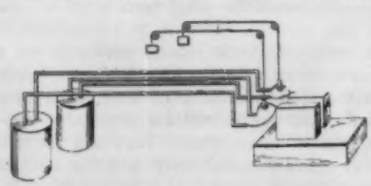
1,331,625. February 24, 1920. **Flexible Connection for Electric Furnaces.** James H. Critchett, Niagara Falls, N. Y., assignor to the Electrometallurgical Company, Niagara Falls, N. Y., a corporation of West Virginia.

In the construction of electric furnaces it is necessary to provide a flexible connection between the electrode and source of power in order to allow movement of the electrode to take care of changes in the level of the furnace and wear of the electrode. This flexibility is usually obtained by the introduction of a short section of conductor



made up of the necessary number of flexible copper cables.

It is the principal object of this invention to provide means for reducing the mutual inductive effect and conversely increasing the power factor of the system.

This object is accomplished by so disposing the elements of the flexible connection relatively to each other that the electro-magnetic effect upon each other is considerably reduced.

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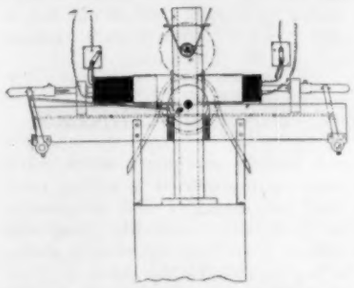
1,332,078. February 24, 1920. **Separation and Extraction of Dust and Iron from Brass Borings, Brass Turnings, and Like Material.** Walter Sowden, of Leeds, England.



This invention relates to improvements in the method of separating and extracting dust and iron from brass borings, brass turnings, and other material, and in apparatus for use in connection therewith.

According to this invention the material to be cleaned is placed in a suitably elevated hopper, and is conveyed therefrom, at any desired rate of feed, by means of a rotating worm device, delivering into the upper end of an upright separating chamber or chute, which in turn delivers into a box or receptacle beneath, or into suitably arranged side or bottom chutes.

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1,331,479. February 24, 1920. **Process for Hardening Copper.** Dewitt T. Beckham, Geneva, Texas.

This invention relates to improvements in metal and it is the principal object of the invention to provide a novel and simple process for hardening copper embracing steps whereby a bending or scaling of a body of such metal subsequent to the hardening of the same by the improved process will be positively prevented.

To harden copper in accordance with this novel process, it is first heated to a certain temperature, either to red glow at a temperature of 1,370 degrees Fahrenheit or to incandescence at a temperature of 1,950 degrees Fahrenheit. Immediately subsequent to the heating of the metal to the desired temperature it is subpected to material pressure, such as by hammering or like operations until the metal body is cold. The hammering of the metal body will serve to close the pores thereof, thus rendering the same exceedingly hard.

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1,332,058. February 24, 1920. **Enamel for Enameling Articles in Sheet Metal or Cast Metal.** Charles Musiol, of Brussels, Belgium.

According to the present invention it is possible to provide valuable enamels which are independent of the compounds of boron, such compounds not being used in the manufacture of these enamels. For the production of these enamels without boron, the following are used: feldspar, fluorid of sodium, fluorid of aluminum, fluorspar, calcareous spar, silico-fluorid of sodium, kaoline or chine-clay, cryolite, magnesia, potash, quartz, sand, saltpeter, soda, alumina, as well as the known opacifiers, metallic oxides and coloring matters.

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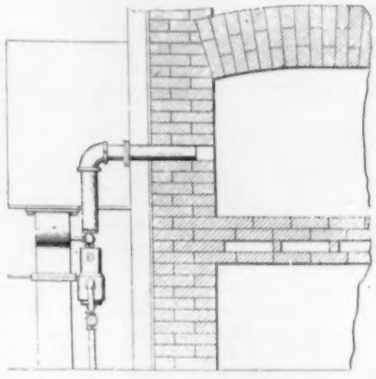
1,332,307. March 2, 1920. **Method for Coating with Tin and Tin Alloys Articles Made of Aluminium or Aluminium Alloys.** Michele N. Salvati, of Turin, Italy; Guido Beer and Arrigo Tedesco, executors of will of said Michele N. Salvati, deceased, assignors to Societa Anonima Stabilimenti Biak, of Turin, Italy.

This invention has for its object a method by means of which a coating of tin and tin alloy may be applied on articles or parts made of aluminium or aluminium alloys, despite of the known property of aluminium that tin is unable to adhere thereto.

According to this invention, the surface of the article made of aluminium or aluminium alloy on which tin is to be applied, is previously coated with a layer of another metal capable of adhering firmly to aluminium and aluminium alloys without giving rise to an electrolytic action when in contact with aluminium, said coating metal being of such nature that tin and tin alloys adhere to it. As an example of said coating metals, copper, nickel, iron, zinc or the like may be mentioned.

1,332,377. March 2, 1920. **Oil-Filtering Attachment for Furnaces.** Max Blum, Bloomington, Ill., assignor to the De Remer-Blatchford Company, Chicago, Ill., a corporation of Illinois.

This invention relates to oil-burning furnaces, and the principal object of the invention is to provide means associated with the oil-supply pipe of a furnace of this type for filtering and at the same time heating the oil before it reaches the burner. The heating of the oil increases its fluidity and makes possible a more efficient filtering thereof, since finer mesh screens may be employed than when the oil is cold. The increased fluidity facilitates vaporization. at the burner, and tends to insure complete combustion.



The operation of the device is very simple. The fuel oil is fed to the filtering and heating device under pressure. The gate is opened and a steady flow of hot air plays on the heating and filtering device, which thoroughly heats the walls of the entire device. The heat is transmitted to the incoming stream of oil in the chamber, which acts rapidly to thin the oil so it will readily pass through the screens, even if they are of very fine mesh without being retarded, leaving impurities behind.

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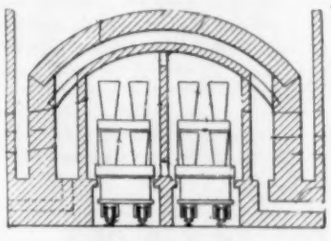
1,332,501. March 2, 1920. **Heat-Treating Furnaces.** Charles J. Kirk, New Castle, Pa.

The object of this invention is to provide a compact form of furnace of this character in which the objects to be treated may be moved continuously through the furnace on a double line of tracks. The cars on one track enter in the opposite direction from those on the other, provision being made for utilizing the heat emanating from the heated cars and the objects on one track for aiding in heating the objects entering the furnace from the opposite end on the other track, thereby conserving the heat and reducing the time required for treatment, and the fuel consumed, as well as producing a uniform heating effect.



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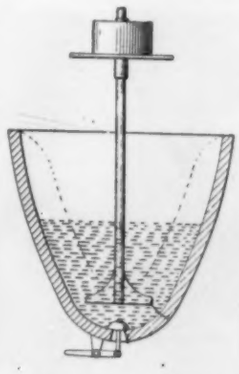
1,332,585. March 2, 1920. **Removing Impurities from Molten Metal.** William White, Washington, D. C.

It should be stated that although the occluded gases, oxides, and other foreign materials are of less specific gravity than the molten metal, the difference is not great enough to cause the gases, etc., to move up through the dense molten metal. But by imparting such a rotary movement to the metal as to change the position of the surface of the metal from a horizontal to an approximately vertical position, the sound metal being more effectively acted on by centrifugal force, will move outwardly, squeezing out the gases and impurities and forcing them toward or to the vertically disposed surface, which is then permitted to assume a horizontal position without any shifting of the position of the impurities relative to such surface.



# EQUIPMENT

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST

## NEW ROTARY PLATING TANK

In bringing out the single unit Rotary Plating Tank, the St. Louis Platers' Supply Company, 2828 Lasalle street, St. Louis, Mo., wish to impress upon the trade that this Rotary Plating Tank is the result of years of actual experience in motion plating.

The circular negative cathode group revolve in one direction, while the circular inner positive anode group travel in the opposite direction, and the outer circular anode group remains stationary. The result is a smooth deposit and very rapid plating. The cathode (or work being plated) being continually forced against new solution, is not surrounded by a weakened area of solution, as in still plating, the motion compelling the furnishing of the required metallic content where needed, and preventing the adherence of gas with the consequent elimination of pitting, the Platers' worst trouble in nickel plating. The positive inner anode group being also moved through the solution, supply the needed metal very rapidly, and permit the use of a much larger current density and amperage than is possible by usual plating methods.

It is claimed that the time of deposition in still plating—from 30 minutes to one hour, depending on class of work—is reduced to a maximum of ten to twenty minutes, which is a material gain on hurry-up jobs. One Rotary Tank, with capacity 325 gallons, it is stated will turn out the same amount of work as three tanks 400-500 gallons each, or two tanks 600-700 gallons. The saving in floor space is considerable, the Rotary Tank, 4x4x3, taking but 16 square feet as against 80 to 100 square feet for same work capacity in still tanks.

Investment of cash in anodes, in tanks and solutions is less than half of that required for still tanks, a part of which are often lying idle, while we furnish these single unit machines singly or in battery form, to be driven from overhead drive. The manufacturers recommend their use with their direct connected Generator Set for either A. C. or D. C. current, which is set on the tank, and Motor for Generator made to furnish power to drive tank mechanism.

Each machine equipped in this way is thereby a complete unit, and can be installed in any part of plating room, independent of separate drive, also all of the current generated is delivered without loss right at the tank, which can be operated independently at any time.

## MULTIWHIRL COOLER FOR OILS

The Griscom-Russell Company, 90 West street, New York City, manufacture an ingenious device for the cooling of oil used in the lubrication of turbine bearings, reduction gears.

The oil is constantly circulated through the cooler, thus maintaining the oil at a constant temperature and permitting the continued use of the original quantity of oil and its maintenance at the proper viscosity for efficient results.

The apparatus takes its name from the whirling path of the oil, which path is accomplished by the use of the helical baffle, which directs the oil in its flow without appreciably retarding its progress. This baffle also serves to bring the oil into intimate contact with the cooling surface and it insures a high rate of heat transfer.

The shell is of cast iron and the tubes of seamless drawn brass or copper, expanded into a fixed tube plate at one end and into a floating head at the other, which latter permits expansion and contraction without strain on the tube joints.

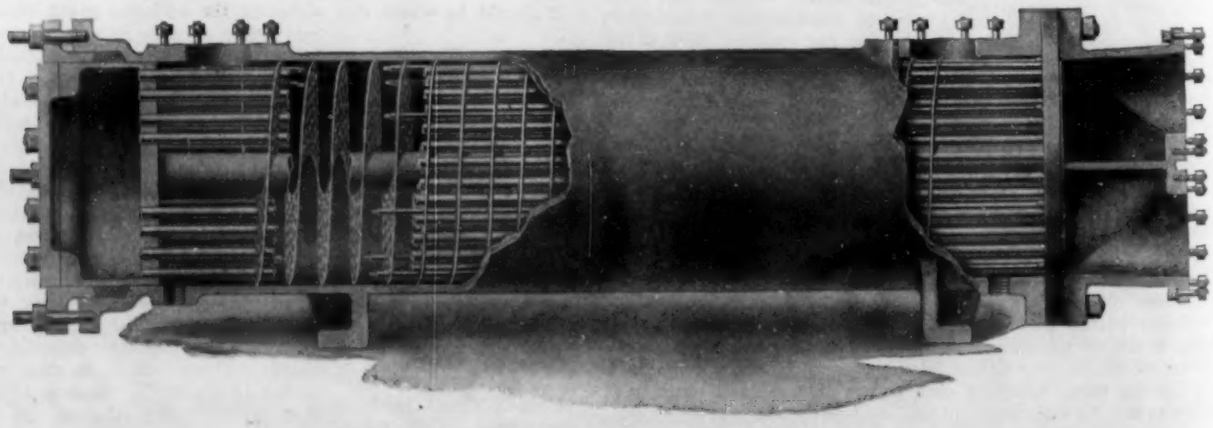
## AUTOMATIC CLEANING MACHINERY

The installation of the most modern machinery which will increase production and decrease man-power is a paying investment. A machine which will automatically and progressively carry work through several operations—especially disagreeable operations which have heretofore been done by several men—is certainly of great interest to any manufacturing concern.

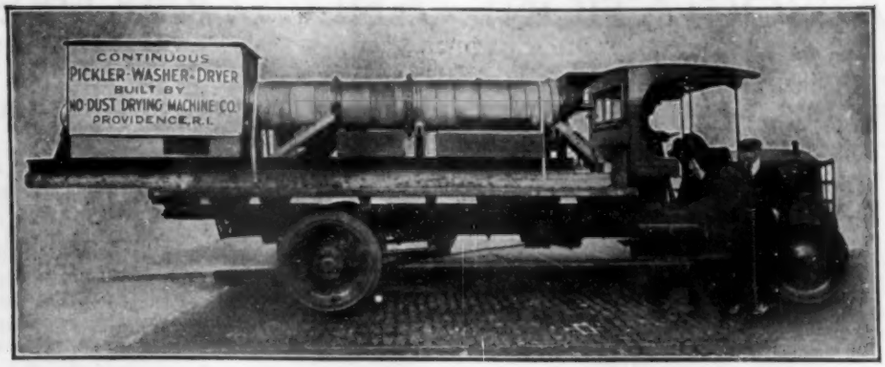
The No-Dust Drying Machine Company, of Providence, R. I., is building such machines for all the operations necessary in cleansing and drying of metal parts in any desired sequence. The work is simply dumped in bulk into the hopper and is discharged into boxes at the other end of the machine. From the hopper the work is picked up by the revolving cylinder and helix and carried forward through several cylinders comprising the machine and performing the various operations, the first of which may be pickling.

As the work leaves the hopper and is slowly tumbled while moving forward, it is first of all deluged with a scoopful of pickling solution raised from a tank beneath the cylinder. This solution pours onto the work through perforations in the cylinder within the scoop. At each revolution a fresh scoopful is picked up and poured onto the work until the work has been submerged in the solution a definite time. It is claimed that the constant slow tumbling in this solution for a definite time insures every piece being pickled alike inside and out. As soon as the work has reached a point beyond the scoop the solution drains off the work—inside as well as out—through perforations in the cylinder into the same tank from which it was raised. The work is then immediately subjected to a fresh and clean water bath from the supply pipe running into the cylinders, first in a solid section, then rinsed off in a perforated section and finally drained free from water. By this time the work is ready for the next solution bath, which is performed in the same manner, correctly timed for the result desired, and followed by the clean water wash. After the work is thoroughly cleansed it enters the hot-air dryer, where it is dried and then discharged.

No matter how many operations this machine may be called upon to perform, the rate of discharge of finished product remains the same, approximately one bushel per minute. Although it may take a single bushel several minutes to pass through the machine,



MULTIWHIRL OIL COOLER




AUTOMATIC CLEANER AND DRYER.

with continuous feed, it means that all of the operations are performed at the rate of one bushel per minute, resulting in a large saving in time. As the work is being tumbled continuously the solution does not remain in cups and recesses, but drains back into the tank. However, the saving which appeals most to the factory management at this time is the decrease in the number of men needed to turn out the daily production and the consequent saving in wages. One man, or two at the most, it is claimed, can keep these machines in continuous operation. No skilled labor is required, nor is it a job for which it is hard to get men to stick; no rubber suits or boots need be worn as there is no slopping of liquids and the men do not come in contact with any wet work.

Patents covering this machine were granted in 1909, 1910 and 1917.

## A NEW PLATING LABORATORY

The W. Green Electric Company of New York have made extensive alterations in their premises of 81 Nassau Street to enable them to have a permanent exhibit of all classes and kinds of electric machinery used by watchmakers, jewelers, silversmiths and platers and particular attention has been shown in completely fitting up a large, medium and small workshop, showing the various processes for polishing, buffing, and electro plating in gold, silver, platinum, copper and nickel, either with plating dynamo, a plating generator set, a plating dynamotor or a battery equipment.

This has been done with the idea of educating the retail jewelers in correctly operating plants of this kind in their own establishments. It will be found both interesting and profitable and something which anyone can handle, whether he is a practical plater or not.

These small plating plants, although quite inexpensive, produce a far greater profit than any other branch of this business, considering the very small amount of expense and capital involved, and the small space actually required for the work bench and accessories.

The W. Green Electric Company will be pleased to demonstrate the different methods to any plater, and all are invited to visit their establishment.

## AIR FOR THERMIT WELDING PREHEATERS

The following data is the result of some recent tests made by the Metal & Thermit Corporation, New York, N. Y., to determine the proper amount of air required for special thermit welding gasoline and compressed air preheaters:

25 lbs. per sq. in. seems to be a practical minimum for operating preheaters. At this pressure, a single burner preheater will require approximately 25 cu. ft. of free air per minute and a double burner preheater approximately 50 cu. ft. of free air per minute. For very large welds, where the walls of the molds are thick and the preheater gates longer than usual, a pressure of 40 lbs. per sq. in. would be advisable, which would require approximately 35 cu. ft. of free air per minute for a double burner preheater and 70 cu. ft. of free air per minute for a double burner preheater.

In the case of a large plant with a central air compressor plant, upon which demands are being made by many departments, the pressure quoted above should be maintained at the outlet to which the preheaters are attached.

## NEW TYPE OF MONORAIL

The H. M. Lane Company, Detroit, Mich., in their attempts to solve foundry problems, have recently brought out another type of monorail. The general principle is shown in the accompanying illustration.

The novel feature consists in placing the man in the cage, in a basket, or elevator, which can be raised or lowered by means of a telescoping arrangement. The cables connecting the controllers for the various motors are all arranged with a flexible connection, so that the man has control of the travel motor, the hoist motor and the motor for hoisting himself up and down in whatever position the cage may be. This enables a man to go out into the yard with a one- or two-hook monorail, pick up a flask and bring it into the foundry without bothering with a helper. It also enables him, in gathering up boxes of castings in a foundry gangway, to go along some time after they have been loaded and allowed to cool for a while and pick them up, taking care of his own hitches in the foundry and his own releases in the cleaning room. In cases where a laborer is absolutely necessary, the laborer can ride in the cage with the operator to the point where he is wanted, and the cage can be lowered to such a position that he can drop and attend to the booking. Also, in some cases, both the laborer and operator would have to work together in handling flasks under the monorail or away from under the monorail.

## SOLDERING CAST IRON

It is frequently desirable to solder cast iron, but mechanics are very generally of the opinion that that is practically impossible.

The solution of the problem lies in the flux used. Tinol Soldering Paste (Flux) evaporates at a heat sufficient to melt tin; it is claimed it leaves behind it a thin coating of clean bright tin to which solder takes readily; also, that this flux has the further desirable property of being without acid reaction and is therefore suitable for electrical and other similar work.

To solder cast iron it is necessary to free the surface of rust, then apply the Tinol Paste, heat sufficiently to melt solder, which is applied as usual. It is made by Hess & Son, 2910 Sixteenth street, Philadelphia, Pa.

## NEW RUST PROOFING PROCESS

The Andrews Rust Proofing Laboratories, of 821 Book Building, Detroit, Mich., have developed a rust proofing for iron and steel which consists simply heating in a furnace which uses gas as a fuel with the admixture of air. After removal from the furnace the work is quenched in oil at 100° F. They claim that the oil, carbonizing on the metal mixes with the oxide formed in heating and sinks into the pores as a paste, which is sealed up by the contraction of the pores on quenching.

# ASSOCIATIONS AND SOCIETIES

REPORTS OF THE CURRENT PROCEEDINGS OF THE VARIOUS ORGANIZATIONS

## AMERICAN FOUNDRYMEN'S ASSOCIATION

The American Foundrymen's Association has published a pamphlet containing the names of Officers and all Standing and Special Committees for the current year.

This is issued in advance of the Year Book, which will not be published until after August 1st, which has been the usual date.

Due to change in the fiscal year from July 1st to January 1st, succeeding Year Books will be published earlier in the year, acquainting the members with the information contained therein several months in advance of the annual Convention, which is the purpose of this special pamphlet. The pamphlet also contains a supplement to the list of members, showing new members elected since August 1st, 1919.

It is sincerely hoped that this publication will result in increasing interest in the Association's activities, in prompting members to make plans now to attend the next annual Convention, and in securing assistance and co-operation in increasing the membership of the Association.

The Technical and Educational Department, Mr. Bean, Chairman, and Mr. Shaner, Secretary, will welcome suggestions and contributions from the members.

## NEW YORK BRANCH A. E. S.

May meetings of New York Branch were well attended; President Sterling presided. One new applicant was elected to active membership. A resolution urging the American and the British governments to adopt the Metric System of Weights and Measures was submitted by Laboratory Chairman Joseph Haas, Jr., and adopted by New York Branch.

A paper was read by Mr. Haas, entitled "Unreliable Criticism of Faraday's Laws."

The elected officers for the ensuing year are: President, J. E. Sterling; vice-president, F. Househalter; secretary-treasurer, J. Burke; recording secretary, S. Schubert; Sergeant-at-arms, J. A. Stremal; assistant sergeant-at-arms, G. Wilson; librarian, J. Haas, Jr. Trustees—P. B. Haddow, W. Fischer, J. Minges, H. C. Flanegan, W. Voss. The following delegates and alternates were elected to represent New York Branch at the 1920 Rochester convention: Delegates—P. B. Haddow, J. E. Sterling, G. Wilson. Alternates—W. Fischer, J. A. Strub, A. Gunham.

## AMERICAN SOCIETY FOR TESTING MATERIALS

The Twenty-third Annual Meeting of this Society was held at Asbury Park, N. J., June 22-25, 1920. Headquarters were at the New Monterey Hotel. Parts of the program of interest to the metal industries were as follows:

Report of Committee B-2: On Non-Ferrous Metals and Alloys. William Campbell, Chairman.

Report of Committee E-4: On Magnification Scales for Micrographs. W. H. Bassett, Chairman.

A Note on the Constitution of Certain Tin-Bearing Brasses. William Campbell.

Fatigue and Impact Fatigue of Aluminum Alloys. W. A. Gibson.

A High-Speed Alternating Torsion Testing Machine. D. J. McAdam.

Improved Elastic Limit Recorder. C. H. Marshall.

A New Method for Calibrating Brinell Hardness Testing Machines. Jesse L. Jones and C. H. Marshall.

Ductility Testing Machines. T. Y. Olsen.

An apparatus for Delicate Flexure Tests and Some Results of Such Tests. W. J. Francke.

Corrosion of Lead Sheaths of Cables.

## NATIONAL SAFETY COUNCIL

Safety engineers who have attracted national attention through their effective work in the safeguarding of power presses addressed the conference of the Engineering Section of the National Safety Council which was held in the auditorium of the Western Society of Engineers, Monadnock Building, Chicago, on June 24, 1920. Safety as it affects production was the motif of the entire program of this conference, which was divided into three sessions, morning, afternoon, and evening—the last a dinner meeting.

The evening meeting was held jointly with the Chicago Safety Council, the Western Society of Engineers, and the Accident Prevention Committee of the Illinois Manufacturers' Association.

The entire afternoon session was devoted to a discussion of the safeguarding of power press operations and the information brought out during this discussion will be used in drafting the national safety code on power presses, sponsorship for which has been accepted by the National Safety Council. A part of the program of the Chicago Conference of the Engineering Section follows:

MORNING SESSION

10 A. M.

1. Safeguarding machinery at the source—report of committee; H. A. Schultz, United States Steel Corporation, Chairman.
2. A time study of cone pulley belt shifting, hand and mechanical—report of committee; H. E. Somes, Chevrolet Motor Co., Chairman.
3. Report of Education Committee; Bruce W. Benedict, Manager of Shop Laboratories, University of Illinois, Chairman.

AFTERNOON SESSION

2 P. M. Safeguarding Power Presses

1. Automatic Feed for Power Presses, by F. J. Littell, F. J. Littell Machine Company.
2. How we Increased Production by Safeguarding Power Press Operation, by A. L. Kaems, Safety Engineer, Simmons Company, Kenosha, Wis.
3. Round table discussion, Fundamental Propositions Underlying a Safety Code on Power Presses (metal working).

EVENING SESSION

(Dinner, Hotel LaSalle, Chicago)

Toast Master—H. G. Ellerd, Armour & Company

1. The Engineering and Production, W. G. Nichols, President, American Manganese Steel Company.
2. Safety and Production, Geo. A. Hart, Superintendent, Melrose Park plant, National Malleable Castings Company.
3. Safety and Engineering Efficiency, Sidney J. Williams, Secretary and Chief Engineer, N. S. C.

## NATIONAL VARNISH MANUFACTURERS' ASSOCIATION

The plant managers of the New York and New Jersey Sections of the National Varnish Manufacturers' Association held their 11th meeting, June 16, 1920, at the Yale Club, New York City, Mr. Frank Schumann, of Hilo Varnish Corporation, presiding.

The plant managers were the guests of Mr. Everett, of the Keystone Varnish Company, who provided an excellent dinner in most pleasant surroundings.

An interesting discussion was held on the subject of Grinding Department Equipment and much valuable data was presented by the various members.

The following varnish companies were represented:

Keystone Varnish Co., Pratt & Lambert, Inc., Pitcairn

Varnish Company, F. O. Pierce Co., Benj. Moore & Co., John W. Masury & Son, Beckwith-Chandler Co., Murphy Varnish Co., Emil Calman & Co., Woolsey Paint & Color Co., Valentine & Co., Armitage Varnish Co., Howe Varnish Co., and the Hilo Varnish Corporation.

The next meeting will be held Thursday, September 16, and it is expected that the work will be taken up with renewed vigor after the summer vacations.

The place and topic for discussion will be announced later.

## NATIONAL ASSOCIATION OF WASTE MATERIAL DEALERS

A meeting of the Metal Division was held at the Hotel Astor on Tuesday afternoon, and the present Metal Classification was approved for another year, with the following changes:

Under "Delivery" there will be inserted a clause as follows: "In the case of a difference in weight and seller is not willing to accept buyer's weight, a sworn weigher shall be employed and the party most in error shall be obliged to pay the cost of handling and weighing."

Item No. 20, "Battery Lead Plates," was changed to read as follows:

"Shall consist of dry battery lead plates to be free from wood, rubber and paper; moisture not to exceed 1 per cent."

The following items were added:

Item 30, Monel Metal Scrap: Must be in sheets, castings, bars, rods or clippings; must be free of iron and other foreign material. To avoid disputes, to be sold subject to sample.

Item 31, Monel Metal Turnings: Must be free of iron and undue percentage of oil or moisture. To avoid disputes, to be sold subject to sample.

# PERSONALS

### ITEMS OF INDIVIDUAL INTEREST

**H. H. Doehler,** president of the Doehler Die Casting Company, Brooklyn, N. Y. acted as chairman of the Salvation Army Home Service Appeal in Brooklyn.

**Rev. J. Prestidge** has been elected president of the Dundee Foundry Company, a newly organized company which is operating an aluminum and brass foundry at Dundee, Mich.

**L. F. Youngs,** formerly Michigan sales manager for the Aluminum Company of America, has been appointed District sales manager for Aluminum Manufacturers, Inc., succeeding **Morgan Harding**, who goes to West Haven, Conn.

**John A. Penton,** president of the Penton Publishing Company, Cleveland, Ohio, was recently elected a director of the Wellman-Seaver-Morgan Company, Cleveland, Ohio, filling a vacancy caused by the death of Samuel T. Wellman.

**Thomas F. Kelly** formerly with the Lackawanna Steel Company has been appointed to the position of sales engineer of the Flue, Dust, Ore, and By-Products Department of the General Briquetting Company, 25 Broad street, New York City.

**Irwin L. Moore,** a son of Samuel C. Moore, general manager of the New England Power Company, a Cornell graduate, will leave Worcester early in July to join the electrical engineering department of the Aluminum Company of America in Pittsburgh. Mr. Moore is 24 years old and during the war was assistant chemist at the bureau of standards at Washington, D. C. He received the degree of A.B. in physics from Cornell in 1917, and B.S. in Electrical Engineering from Massachusetts Institute of Technology, this year.

**Carl Wigtel,** vice-president and chief engineer of The Watson-Stillman Company, sailed on June 14th on the S. S. **Drottningholm** of the Swedish-American Line, for a ten weeks trip to the Scandinavian countries. He also expects to visit England, France, Belgium and Holland. While Mr. Wigtel is going mainly for a vacation, this being his first trip to his old home in Norway, since his connection with The Watson-Stillman Company, thirty-five years ago, he will also investigate new developments in the line of hydraulic machinery in all of the above countries.

**Herman L. Wittstein,** who was until recently with the Chapman Valve Manufacturing Company, Springfield, Mass., has assumed charge of production for the Morris Metal Products Corporation, Bridgeport, Conn. This company manufactures in quantity, castings, die castings and metal parts of machinery. Mr. Wittstein was largely responsible for the large production records established at the United States Armory at Springfield, Mass., during the war, where he superintended the installation and operation of more than a half million dollars' worth of modern ordnance machinery without diminishing the production. Mr. Wittstein is a native of New Haven, and a graduate of the Sheffield Scientific School of Yale University.

## DEATHS

### GEORGE W. SCHWEINSBERG

Among those who lost their lives in the New York Central wreck on the night of June 8, 1920, was George W. Schweinsberg, of 288 Ryerson street, Brooklyn, N. Y.

Mr. Schweinsberg was born at Ellwood City, Pa., July 19, 1886. He entered the galvanizing industry at the age of eighteen, which he followed since exclusively, his more important connections being with the Safety Armorite Conduit Company, Western Conduit Company, American Conduit Company, etc.

In July, 1914, he became connected with the U. S. Electro Galvanizing Company, of Brooklyn, N. Y., by which concern he was employed until his death. Mr. Schweinsberg originally was connected with the job galvanizing department of the U. S. Electro Galvanizing Company and in the Plant Manufacturing Department, when he expressed a desire to act as traveling salesman. In this latter service, his record speaks for itself and in which connection he made many staunch friends for himself and for the company. His rapid advance in this company and the high esteem in which he was held by his employers is largely due to the loyalty demonstrated generally and, in particular, in the handling of a number of important business matters that were assigned to him in addition to his regular work.

He was a member of the American Electro Platers' Association, New York branch, the Brooklyn Chamber of Commerce and other organizations.

### EDMUND GYBBON SPILSBURY

Edmund Gybbon Spilsbury, formerly managing director of the Trenton Iron Company, and a mining and metallurgical engineer of international reputation, died recently in a New York hospital of heart disease, where he was taken to undergo an operation on his eyes. Mr. Spilsbury lived in Trenton for several years and later removed to 1623 Albemarle Road, Brooklyn. The deceased was a consulting mining engineer and visited many parts of Europe, Africa, the United States, Mexico and South America. A few weeks previous to his death he returned to the United States from work on a mining project in Brazil.

Mr. Spilsbury was president of the American Institute of Mining and Metallurgical Engineers in 1896 and of the Engineers' club of New York in 1916 and 1917. He was a member of several other engineering societies in this country and abroad and also served on the division of engineering of the National Research Council of Washington and New York.

# TRADE NEWS

## BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS

### WATERBURY, CONN.

JULY 6, 1920.

Waterbury is still an open shop city, though about 20,000 skilled and unskilled laborers, one of whose chief demands has been the recognition of the union, have been on strike for two months from practically all of the city's large brass factories. The strike is not yet over. There are indications, however, that the men are returning to work in increasing numbers, and it seems probable that the industrial unheaval of the past weeks will result in defeat for the workers.

The situation, in its outward manifestations, has been serious. Since the strike started, there have been three bombings and one riot. The first bombing was on the night of May 30, when someone placed a stick of dynamite on the piazza of the home of John H. Gross, secretary and general manager of the Scovill Manufacturing Company. The explosion, however, only partially injured the piazza and sun parlor of the house.

The second explosion took place on the night of June 13 at the home of several foreign employees of Chase Metal Works, which partially wrecked the building. The last occurred on the 24th, when the house in which five employees of the American Brass Company slept was bombed and partially wrecked.

The riot occurred on the 21st and resulted in the death of one striker, Alberto Tiso, 19-year-old employee of the Chase works, and the injury of two patrolmen, Lieut. Richard Le Roy, of the traffic department, and Chief John J. Bergin, of the special police force of the Scovill Manufacturing Company. Both policemen are still in the hospital, not yet out of danger.

Thus in the short space of one month outrages such as might have seemed more likely to occur in chaotic Russia have occurred in the leading brass city of the world. So far no one person has been brought to justice for the crimes committed. The police have arrested and tried a few strikers concerned in the riot on the charge of intimidation and other minor charges. But the real criminals have not been brought to light.

Benjamin Baker, industrial editor of the New York Evening Post, who made a thorough investigation of the situation, called it a "desperate drive by the American Federation of Labor to gain a foothold here." He reviews the situation somewhat as follows:

"Late in April, Ira N. Ornburn, secretary of the Connecticut state federation of labor, succeeded in precipitating a strike of the nearly 8,000 members of the New England Workers' Association (the unskilled workers of Waterbury), who were on the whole opposed to striking, but were tricked and forced into it. When the strike of the unskilled laborers early in May showed signs of disintegrating, the second strike, that of the machinists, was set in motion. Joseph M. Tone, national organizer for the International Machinists' Association, displaced Organizer Doyle, who had been holding the machinists back from a strike. Under Tone's direction, apparently as a part of Ornburn's campaign, the Machinists Local 313 (which included many of the skilled machine operators) presented demands for a 35 per cent. increase of wages, eight hours work in 24 and, like the unskilled workers, recognition of their shop committees. Under present conditions, skilled machinists in Waterbury work a 50-hour week on a basic eight-hour day, with time and a half for overtime over eight hours in any 24."

The manufacturers' argument is this: Previous to the strikes of June, 1919, the manufacturers claim that they were planning extensive increases in wages for their employees, recognizing the great increase in the cost of living. The strikes came before these raises were put into operation. After those strikes the manufacturers did give a basic eight-hour day with time and a half for more than eight hours in each 24, a 25 per cent. increase to all workers (including office forces), who were receiivng $4 a day or more on the hourly basis; 10 cents an hour more to all receiving less than $4 a day and a 20 per cent. increase on piece rates.

Investigations of the high cost of living made here by competent officials have shown an increase in the cost of living of not more than 110 per cent. since January, 1915, while the present average wage of all labor in Waterbury shows an increase of 200 per cent. Further investigations show that scores of alien workers have savings ranging from $600 to $2,000 with the same standard of living they had three or four years ago.

So some of the reasons for the resistance of the manufacturers has been the claim that their workers are reasonably well paid in proportion to the present cost of living, that any concession at this time would be interpreted by the strikers as an indication that they could force further concessions by other strikes. Being, as they are, unalterably for the open shop, they are as determined to maintain this attitude as before.

Added to the question of open shop is the economic factor which is somewhat paradoxical. Strike agitators chose a poor time to call a strike. Freight conditions in April and May were such that far from the normal supply of coal or raw material could be imported and far from the normal supply of finished product exported. Consequently, the manufacturers could well afford for a time to shut down a part of the departments, and they were enabled to maintain their position more easily.

In answer to the demand for an actual eight-hour working day manufacturers say this is no time to decrease working hours or increase wages. The call for increased production everywhere is so insistent that it would be the greatest folly to do so at this time."

This is a bird's-eye view of the whole situation as it is today. Advisers of the strikers, self-constituted and otherwise (with the exception of the paid agitators), recognize the futility of holding out further and are urging strikers going back to work. Many of them are doing so. Luigi Scalmana, president of the New England Workers' Association, has given permission for married men to go back to work. Many of the machinists are also going back.

During the strike, the Superintendent of Police, George M. Beach, has allowed no parades of strikers and public meetings only under certain restrictions. This has aroused considerable controversy, first as to the right of the superintendent to forbid parades, and, second, in defense of the right of free speech. It is said that the labor officials are planning to fight for the latter in the courts, having retained counsel for that purpose.

Early this month the machinists were promised $8 a week from federation treasuries throughout the country, if necessary, while they were on strike. Complaints have been made that this benefit has not been received.

An interesting attempt, which failed by the way, was that of a committee of impartial citizens to bring about an agreement between the strikers and the manufacturers. After about a week of pacific endeavors, the committee dissolved.

It is estimated that Waterbury is losing about $1,000,000 weekly through the strike. The strikers themselves lose about $300,000 to $400,000 every week in wages. Machinists and unskilled laborers have been leaving the city in large numbers to secure work in other cities.

The strike riot which occurred here on June 21 took place when about 600 strikers attempted to parade about the Scovill Manufacturing Company during the noon hour. When told to disperse they did so temporarily, but picketed themselves near one of the shop entrances and ridiculed fellow workers who went to work. Trouble started when reserve police and city guards with machine guns rushed to the scene and ordered them to disperse. Some of the strikers were armed. Others threw rocks.

It has not been proved that Alberto Tiso, the 19-year-old striker who was killed by a policeman, is the one who shot Patrolmen Le Roy and Bergin. It is claimed that he made a denial of the fact in a dying statement. Several strikers were wounded besides the policemen.

The funeral of Tiso was dramatic. Police guards were about the house and prevented any disturbances. A street parade was forbidden by the police in connection with the funeral. Tiso was buried in unconsecrated ground without a church funeral. Later, however, permission was granted for burial in consecrated ground.

Following the riot, a battalion of the State Guard was called out to protect the city. Martial law, however, has not been main-

tained as was claimed in false reports. Governor Marcus Holcomb visited the city to investigate conditions and promised the aid of the entire State Guard to maintain order, if need be.

The crafts affiliated with the Building Trades Council may soon start a movement for a $9 day. The carpenters, plumbers, sheet metal workers and other crafts of a similar nature will receive $1 an hour beginning August 1, but new plans call for $1.12½ an hour. The annual agreement signed between the master builders of the city and the various crafts last April stipulated various increases, the average being 87 cents an hour.—D. H. P.

## NEW BRITAIN, CONN.

JULY 6, 1920.

The advent of the summer months finds no appreciable decline in the business of the New Britain metal manufacturing concerns and all indications point to a busy summer and, if one may be permitted to venture what seems a safe prediction, a busy fall and early winter. The same holds true of the larger manufacturing concerns in the suburbs of New Britain, particularly Berlin and Plainville, in which are located the Berlin Construction Company, at which is made all sorts of structural steel for buildings and bridges, and the Trumbull Electric Company, makers of electrical supplies, switches, etc.; Standard Steel and Bearings Company, makers of ball bearings; Newton Manufacturing Company, makers of screw machine products; and the Edwin Hills Manufacturing Company, hardware manufacturers. In each of these suburban plants orders on the books exceed the rate of production and the factories are making every effort to speed up their output.

In New Britain the same thing holds true, and were it not for the almost prohibitive cost of construction work, several of the big concerns would now be undertaking additions to care for their increased business. This is especially true of the Landers, Frary & Clark plant, which is badly in need of a new aluminum ware factory. The great demand for Landers, Frary & Clark household utensils, including vacuum cleaners, vacuum bottles, traveling kits, etc., makes their aluminum department one of the most important. The cutlery department is also rushed with orders and finds it impossible to catch up with the large number of orders that were piled up during the war days.

The Stanley Works and the Stanley Rule & Level Company, since their merger several months ago, are bending their efforts to increase production and to increase the demand for Stanley tools. The first named concern specializes in cold and hot rolled steel and wrought steel butts and hinges. The second named plant makes every conceivable tool used in the carpenters' building trade from glass gages and levels to the finest saws. At present there are 64 salesmen, representing these two industries, assembled here for their annual convention to learn more about the industry and to absorb ideas for pushing sales. Reports at the Stanley Works show that during the past year 18 new, separate and individual articles were placed on the market and proved successful.

With the North & Judd Manufacturing Company, makers of buckles and metal novelties, as well as the Traut & Hine Manufacturing Company, where similar products are turned out, business is good. The P. & F. Corbin division of the American Hardware Corporation, makers of builders' hardware, is maintaining a full schedule, as is the Corbin Cabinet Lock division, the Russell & Erwin division, and the Corbin Screw division. The R. & E. division specializes in door locks of all kinds, and with the increased building activities about the country its output is in much demand. Screw products are the chief output at the Corbin Screw Corporation and this, together with the Corbin-Brown Speedometer for Ford cars which is also a big seller, keeps that branch humming. The New Britain Machine Company is bending all its energies to perfecting and creating a promised demand for its farm tractor.

The moulding concerns here are likewise doing well. This is especially true of the Vulcan Iron Works branch of the Eastern Malleable Iron Works. Other smaller jobbing foundries are also rushed with overflow orders from the bigger plants, as well as individual orders. All in all, it looks like a big year for New Britain industries, especially since there seems not the slightest thought of labor disorders.—H. R. J.

## HARTFORD, CONN.

JULY 6, 1920.

**The Underwood Typewriter Company,** of this city, which came to Hartford from Bayonne, N. J., in 1901, with 300 employees, working in a floor space of 74,550 feet, has, in twenty years, increased the working force fourteen times and the plant area ten times. Incidentally, the production has increased seventeen times. At present, 4,700 workmen are employed by this concern, which occupies 840,168 square feet of floor space. The company has in mind a building project which will add materially to its expansion.

**The Jewell Belting Company,** of this city, which will soon move into its new plant, will this year observe the 100th anniversary of its career. Starting in Manchester, N. H., the company has been successful throughout the long period of years, and is one of the livest concerns in Hartford.

Following repeated protests against the building code, the **Hartford Rubber Works,** through its president, C. B. Whittlesey, has written again to Mayor Newton C. Brainard, asking for a final and definite revision of the code. According to Mr. Whittlesey, the "excessive" building rates in Hartford interfere with the expansion of manufacturing plants, the principal objection of the manufacturers being to the fee system, which asserts Mr. Whittlesey, is higher than any of twenty cities in New York, New Jersey, Connecticut and Massachusetts. The president of the rubber works communicated with the building departments of twenty cities in regard to the fees which they charged for permits for new construction, and learned that Hartford is on the topmost rung of the ladder. Agitation in regard to the system of fees has resulted in various amendments to the code, the principal one providing that the maximum fee for building permits shall be $5,000.

Manufacturers and others are interested in the building plans of the **T. C. Desmond Company,** which is now engaged in the construction of ninety new houses on the Zion street tract. It is planned to sell these houses at a price as near actual cost as possible. When completed, they will be sold to individuals with the stipulation that they are not to be taken for investment purposes. With the constantly-growing need of the city for additional housing facilities, and with the expected expansion of the various manufacturing plants, some of which have already arranged for big building projects, necessitating the employment of additional workmen, something must be done to house the men, women and children of Hartford.

When the building operations are completed in this section, other tracts will be available. It is expected that the erection of these houses will relieve the housing situation in such a measure as to provide enough houses to go around.—W. A. L.

## TORRINGTON

JULY 6, 1920.

Several Torrington manufacturers attended the Conference held in New Haven June 28 between the Connecticut Manufacturers Association and the New Haven road officials. The purpose of the conference was to discuss the transportation needs of Connecticut. President E. J. Pearson, of the New Haven road, informed the manufacturers that the two great needs of the road are men and locomotives. There appears to be no car shortage at present. The difficulty is in moving the cars. President Pearson was optimistic, however, and said that the manufacturers might expect a hig improvement in transportation conditions in the near future. The manufacturers assured the road officials that the industries of the state would co-operate in every way possible in reaching a solution of the problem.

The population of Torrington is 22,055, a gain of 31 per cent over 1910, according to the 1920 figures announced last month. The population of the borough, exclusive of the town, is 20,623, a gain of 33.2 per cent.

**The American Brass Company** has purchased the M. T. Hayes property on Water street. The deal involved over

$33,000. The property has a frontage of about 70 feet and includes a brick store and tenement building. It has been on the market for some time. Just what use is to be made of it by the brass company has not been announced. The brass company several years ago acquired property on Water street, east of the Hayes property.

Building permits were granted on June 28 to the **Turner & Seymour Manufacturing Company** for the erection of a brick coke storage bin, 25 x 30 feet, next to the foundry building, at a cost of $2,500; and for the alteration of a shed in the company's yard.

A foundry has been opened in a remodeled building at Broad and New Litchfield streets. The basement and upper floor of the building are being used. Articles of brass, bronze and aluminum are being turned out. Ernest Booth, formerly with the Turner & Seymour Company, is one of the owners of the new concern.

**The Torrington Company** has announced that it has contracted for the purchase of additional plant facilities at Worcester, Mass. The property, including extensive buildings and land was formerly owned by the Worcester Machine Screw Company. Floor space in the newly acquired plant available for manufacturing is even larger than that in the new six-story unit recently constructed at the Standard plant here.

## BRIDGEPORT, CONN.

JULY 6, 1920.

The metal industry in Bridgeport is plagued by lack of coal and materials, and inability to get the products to market on account of labor difficulties on the railroads, which have caused most of the factories to take advantage of the old custom of shutting down for a week or two during the holidays with the ostensible purpose of taking inventory. The coal situation here has not improved and most of the factories have only enough fuel on hand at any time to suffice for a week or two. The increased coal supply which was expected when the government officials announced that coal would be diverted to this section of the country has not as yet made itself evident here.

In labor circles it is claimed that the shutting down of some of the factories is the result of a combine among the manufacturers here to try to force the skilled workmen and other workers to accept less pay for the work they are doing. They say that some of the factories have laid off large bodies of men at a time and at the same time have been advertising in outside cities for help. When men arrived here in answer to these advertisements the management has employed those who were willing to take lower wages.

The trolley company claims that it is not able to do a paying business here as a result of the competition of the jitney busses which are patronized by the bulk of the traveling public because of the lower fares, and quicker and more frequent service.

The jitney men say that they will be able to handle the situation as they have been able to make arrangements for bringing a large number of jitneys to the city which will be available if the trolleys stop.

**The Locomobile Company** has laid off 1,200 men permanently and has shut down the factory for two weeks.

The officials of the **General Electric Company** which has taken over the Remington Arms plant are getting things in readiness to open with a large force of men about September 1.

All of the factories in the city report that they have large numbers of orders which they are unable to fill on account of the transportation difficulties.

## PHILADELPHIA, PA.

JULY 6, 1920.

The metal industries of this neighborhood are feeling unsettled conditions more than at any period of the present year. The newest "outlaw" strikes of railroad workers on the various railroad systems entering Philadelphia are causing more congestion of traffic than the tie-ups of early spring. Receipts of fuel and raw materials are very poor and deliveries of finished products are uncertain.

The immediate results of the transportation troubles have been a halting of inquiries and orders, especially among the machine tool builders. Although most shops here have a good volume of unfilled orders on their books, the prospects are not so good for continued brisk business after the present work on hand is delivered.

Labor conditions in the shops are fairly satisfactory. Although there have been some scattered strikes, none have been serious enough to handicap production to a great extent. There is still a steady demand for skilled mechanics at the majority of employment offices, and agents report that no men who want jobs are being turned away in any of the trades, except possibly shipyard workers. Many of these are being laid off in some of the larger yards, but most of them are able to find employment in other industries.

There appears to be less unrest among workers in most lines, and men are sticking to their jobs better than at any time since the war. Wages are holding steady with no indication of reductions. Workers in many of the building trades have had recent advances.

The **Hurley Motor Company,** with headquarters at Broad and Race streets, is planning to erect a 15-story building, 58 x 130 feet, to cost about $750,000. Construction is to be started in the near future.

The **General Electric Company,** of Schenectady, N. Y., has acquired about twenty acres at Elmwood avenue, between Sixty-eighth and Seventieth streets, as a site for their new manufacturing plant, the estimated cost of which is to be $5,000,000, including equipment and machinery. Work of erection is to begin in the autumn. According to report, the site cost the General Electric Company $275,000.

The **Enterprise Manufacturing Company** is planning to erect a new boiler and engine house at its hardware specialty works at Bodine and Susquehanna streets at a cost of $28,000.

The **Biddle Motor Car Company, Inc.,** 1210 Frankford street, automobile manufacturers, will soon issue capital stock to the amount of $375,000, the proceeds of which will be used for new extensions and equipment for the body manufacturing plant.

**The Simmons Company,** Twenty-fourth and Vine streets, manufacturers of brass beds, has awarded a contract for a two-story addition to its building at Hunting Park Avenue near Twenty-fifth street, to cost about $200,000. The addition will consist of third and fourth floors to its present two-story building.

**The Sun Shipbuilding Company,** Chester, Pa., is working on its plans for the expenditure of $3,000,000 for new shipways, shops, machinery, and a floating drydock. The shipyard now employs 7,000 men and has work on hand to keep that number busy for two years.

The board of directors of the **Abrasive Company,** manufacturers of grinding wheels and appliances, recently elected the following officers: Louis T. Byers, president; J. H. Byers, vice-president and general manager; Lawrence J. Morris, second vice-president; Samuel R. Byers, secretary-treasurer; and T. F. Muldoon, assistant.

The **Electric Storage Battery Company,** Nineteenth street and Allegheny avenue, is planning to erect a two-story brick shop addition 82 x 160 feet, at an estimated cost of $125,000, including equipment.

**Leeds & Northrup,** 4901 Stenton avenue, manufacturers of electric measuring instruments will soon erect a new works on a three-acre plot recently acquired on Germantown avenue near Wayne Junction.

## INDIANAPOLIS, IND.

JULY 6, 1920.

Plans have been completed for a new pattern shop and a new foundry building by the **Acme Works, Inc.,** which is a continuation of the Acme Pattern Works and the **Acme Aluminum and Brass Works,** both organizations having been in business in Indianapolis for several years. The new buildings will be erected on the site now occupied in part by the **Acme Aluminum and Brass Works** on South Harding street

and the Pennsylvania Railroad. Officers of the company are: **President, Peter Lambertus; vice-president, Samuel Gray; secretary, Harlin Hogue, and treasurer, Frank L. Bridges.**

With the purchase of 46,000 square feet of land on South Meridian street, Indianapolis, Ind., announcement was made recently by officials of the **Cleveland Metal Products Company** that the entire tract would be covered with buildings. Plans are being drawn for the construction of the first building, which will have a floor area of 20,000 square feet. It will be one story high, of brick and structural steel construction. It will cost approximately $100,000. **John Ford,** district manager of the Indiana and Illinois district, states that later another building will be erected to cover the remainder of the ground. The same style of construction will prevail in the second building.

Work has begun on the construction of a building for the **Dill Foundry Company,** of Rushville, Ind. The project is being financed by **William Dill,** of Rushville. The building will be 70 by 105 feet. The equipment already has been purchased and much of it is on its way to the new plant. Every phase of foundry work will be done at the plant.

**Robert Kerr,** 37 years old, superintendent at the mill of the **American Zinc Products Company,** at Greencastle, Ind., committed suicide recently in the office of the company by shooting himself in the head with a revolver. No reason is known for the act. Mr. Kerr located in Greencastle two years ago, when his brother, D. W. Kerr, and his associates purchased the old tinplate mill and converted it into the present plant of the American Zinc Products Company. The Kerrs sold their interest some time ago.

The **Haywood Foundry Company** recently filed articles of incorporation with the secretary of state of Indiana. The company's home office will be Indianapolis and it is capitalized at $150,000. It will manufacture metal products and the directors are **Milner E. Haywood, Arley H. Cromley** and **Harry Farris.**

**The Pioneer Brass Works** secured some favorable publicity recently through subscribing to the lap prize given by business firms in Indianapolis to the lap winners in the motor speedway races. The Indianapolis Chamber of Commerce asked 200 firms to give $100 each, making a total of $20,000 in prizes, the winner of each of the 200 laps in the 500-mile race to be given $100.

That foundries are becoming more and more valuable for practical instruction purposes is shown by the fact that the entire foundry class of the Vocational School in Terre Haute, Ind., was taken on a tour of inspection of the foundries at Brazil, Ind. The class visited the foundry of the **Crawford-MacBeth Company, the Crawford-McCrimmin Foundry** and were shown all phases of the work.

## DETROIT, MICH.

JULY 6, 1920.

The manufacturing outlook in this section just at present is not as encouraging as it has been for several months past. No one knows what the future is going to bring forth. While the presidential campaign is having more or less depressing effect on conditions, the greatest danger now lies in the transportation problem. There is no denying the fact that Detroit is unable to ship in all the coal and raw material it needs, to say nothing about being able to dispatch completed products to their destination. Considerable of the strain in this regard has been relieved by lake transportation facilities, but manufacturers can not ship their products to extreme parts of the country by the water route. More freight cars and a more rapid handling of freight are the demands from all sides, but Detroit is not getting them, so manufacturers are at their very wits ends at times to keep things going.

It has just been announced that the coal situation has become so acute that manufacturers, in an effort to build reserve supplies, are bidding up the price so high that it soon will be almost prohibitive to some. Within a very short time it is predicted that coal will be selling in Detroit from $22 to $25 a ton, something that never was known before. Just how this is going to affect this section is a difficult matter to forecast but it is certain if coal is retailed in Detroit two or three months from now at these prohibitive prices, the smaller plants will have to cease operations and great numbers of people seek other places where they can keep warm at considerably less cost.

Notwithstanding the obstacles that must be overcome, the brass, copper and aluminum industries are maintaining a wonderful pace. The automobile is back of all this of course. There does not seem the least break in the demand for cars. It is impossible to get a new car from the Ford Motor Company in less than two to three months and the same condition is reported in many of the other great plants. However, these concerns must have raw material, and coal, and they must be able to deliver their manufactured products if they are to continue operations. The greatest difficulties are expected in the fall and winter months. If the railroads hold out and the coal mines produce, Detroit will get through after a fashion. If they fail—well that is left to the imagination. No one likes to think about it.

## ROCHESTER, N. Y.

JULY 6, 1920.

Midsummer finds every manufacturing institution in this city running at top speed, but menaced by a serious shortage of supplies unless the railroad shipping facilities are improved presently. The railroad situation in Rochester is very bad—in fact it is much worse than a month ago—and manufacturers and purchasing agents are beginning to worry.

The Waterbury situation has had a serious effect on local conditions, although many of the larger users of brass in its various shapes were fortunate to have reserve supplies. Then, too, there has been some inside borrowing or trading, and tight situations have thus been avoided until a shipment by rail came through.

The brass and copper market in Rochester is very firm, the metal being in demand at all times and obtainable if the freight situation would clear up. Express shipments are fairly good, although subject to delay because of the fact that so much business, regularly received by freight, is now carried by the express companies at higher cost to the manufacturers.

Rochester requires a great deal of aluminum, and for many months past has been receiving but about 40 per cent of her share. Owing to the tremendous demand for this metal many concerns here are six months behind in their supplies. Tin is easier and lower in price, which is rather unusual all things considered. There is no change in the market for zinc. The metal is always in strong demand here.

Feeling that there will soon be an end to these strenuous days of reconstruction, a number of the larger plants, such as the Eastman Kodak Company, the Bausch & Lomb Optical Company, and the General Railway Signal Company are planning the construction of new buildings.

The gift of $9,000,000 to the University of Rochester by George Eastman and the Rockefeller General Board for the establishment of one of the greatest schools of medicine, surgery and dentistry in the world, means the erection of many buildings and laboratories and the extensive use of all of the metal products.—G. B. E.

## ROME, N. Y.

JULY 6, 1920.

Great activity prevails in all the metal industry plants of this city, both day and night shifts being employed in shops here, which are running on a 48-hour week for day workers and 50 hours for night workers. New buildings are in course of construction and everything points to immense progress here in the future.

### HOUSING CONDITION

In Rome, as well as in many other cities where there has been a decided growth in industrial lines, the housing of employes is a problem which confronts the heads of large manufacturing plants, who are anxious to offer inducements to men and their families to locate permanently and establish homes.

It is well known that there is a shortage of houses in Rome, and has been for some time, and the question is often asked, "What is to be done to relieve the situation?" In answer to

this it may be said that the **Rome Wire Company** has taken up the matter in the interest of its employes and will place within reach of them the possibility of having homes in the near future.

The company has purchased a 16-acre plot of land, located on the north side of East Whitesboro street, lying between the plant of the Rome Gas, Electric Light & Power Company and Mill street, being on the west side of Mill street, just north of the Barge Canal bridge.

A landscape artist is now engaged in preparing plans for laying out the land into building lots, facing on a system of well arranged streets, and as soon as his plans are turned over to the company and are accepted, the building lots will be offered to the employes at cost.

Under the plans adopted by the company any employe having cash to the extent of 10 per cent. or more of the cost of a house and lot complete may own his own home. The company has made arrangements so that any employe may pay 10 per cent. in cash, secure a first mortgage of 60 per cent. and a second mortgage of 30 per cent. of the total cost of the house and lot and make easy monthly payments on the same. Also any employe may select and obtain an option on any building lot in the city of Rome, the location and price of lot, however, to be approved by the building committee of the company. The cost of the lots on the plot to be laid out is given at probably $100 to $200 each.

The Rome Wire Company has 1,200 people on the payroll at present, and the outlook is good for a greater number. To meet conditions because of the expansion in their business, their buildings have been enlarged and new buildings erected, some being under construction almost continually for several years back.

Extensive construction is now under way and being planned to make room for buildings contemplated.

BUSINESS CONDITIONS

With reference to plant conditions here and at Buffalo, **H. T. Dyett,** president of the **Rome Wire Company**, said:

"Last December we purchased the wire drawing and insulating departments of the B. F. Goodrich Company, of Akron, O. We secured a factory in Buffalo and have erected an addition thereto in which to locate the wire business formerly conducted by the Goodrich company. This business is known as the Diamond Branch of the Rome Wire Company and is now in operation.

"Some little time ago, we sold some of our 7 per cent. first preferred stock and with a portion of the proceeds of this sale of stock we financed the building of our Buffalo plant, and are also putting up certain additions in Rome.

"We now have under construction a two-story building so as to enlarge our rubber-covered wire department and to add lead-covered cables to our line of goods manufactured in our rubber wire department.

"Our bare wire department has been very much crowded in recent years and we plan during the summer to erect a two-story addition to this department. This will enable us to enlarge our capacity and at the same time make the working conditions pleasanter for our men. Later this year, if conditions warrant, we anticipate erecting a building for the manufacture of weather-proof wire.

"For a number of years prior to the war, the electrical industry suffered a setback owing to the difficulty of financing railway and public utility extensions. At the present time these extensions seem necessary. With the increasing use of electricity in the home and on the farm, we look for a good demand for all electrical products for some time to come."—M. J. D.

## PROVIDENCE, R. I.

JULY 6, 1920.

All lines of the metal industries in Providence and vicinity, continue to run upon a full schedule with sufficient orders in hand to insure active operations for some time to come. For the first six months of the year the reports indicate a very satisfactory volume, notwithstanding the many handicaps that have had to be contended with.

Freight enbargoes still hinder the shipments of finished products, while the shortage of material is a serious drawback. Strikes and other labor troubles dealing with hours and wages have contributed their deterrent influences to the situation and the fuel question, both as to the oil and coal supply, have added to the general problems. The stiffening of money rates and the tendency toward a curtailment of credits have also become factors in the worriment that is keeping the manufacturers and business men on the anxious seat.

In the varied lines identified with and co-ordinate to the manufacturing jewelry industry there has been a slight falling off in activities, and many of the manufacturers are adopting a somewhat conservative policy in regard to future bookings that is reducing to a material extent the rush conditions that have prevailed during the past eighteen months. There have been a number of cancellations of orders by jobbing houses in all sections of the country and there is talk on the part of several of the manufacturers to hold a meeting to formulate some plan whereby cancellations will not be permitted.

GORHAM REORGANIZATION

One of the most important and far-reaching changes that has occurred in connection with the manufacturing metal branches in many months, was the announcement late the past month of the preliminary steps by the **Gorham Manufacturing Company** and the various silversmithing corporations that form the Gorham system for a reorganization, with several changes in the personnel of the officers. At a meeting of the directors of the Gorham Manufacturing Company and later of the Silversmith Company held at the offices in Elmwood, the committee on reorganization recommended a plan whereby The Silversmiths Company of New York, which has been the "parent" or holding company of the several silversmithing corporations in the Gorham system since its organization in 1892, will eventually be eliminated and will make the Gorham Manufacturing Company the holding company for the Gorham Company of New York; the Mount Vernon Company Silversmiths, Inc., of Mount Vernon, N. Y.; the William B. Durgin Company of Concern, N. H.; the Whiting Manufacturing Company of Bridgeport, Conn., and the William B. Kerr Company of Newark, N. J., all of which are now subsidiaries of The Silversmiths Company. These concerns are to manufacture in their own plants and sell through their own sales organizations non-competitive lines of sterling silver, plated silver, bronze and other similar products.

To this end, by which the business of the Gorham Manufacturing and affiliated concerns are to be placed on a more efficient and economical basis of production, Harry A. Macfarland, vice-president of the Mount Vernon Company, Silversmiths Inc., and prominent in the affairs of this group of silver companies, has been elected president of the Gorham Manufacturing Company, succeeding John S. Holbrook, who has resigned to become chairman of the board of directors, a new office created that Mr. Holbrook may direct closer attention to the financial and managerial affairs of the business.

President Macfarland will control production throughout the Gorham system, but each subsidiary company will develop its own market, with its own sales organization. Plans for additional financing of the reorganized Gorham companies are now being worked out by the committee on reorganization and finance, to be made public later.

BROWN & SHARPE ADDITION

A dormitory for apprentices of the **Brown & Sharpe Manufacturing Company** has been opened at 58 Park street, Providence. It is believed that the plan for housing employes of industrial plants is unique in the United States, although similar provisions exist in some of the European countries. The application of the idea originated with J. Edward Goss, supervisor of apprentices at the Brown & Sharpe Company, who has heretofore experienced great difficulty in finding satisfactory accommodations for boys from out of the city who are taking the training course at the company's plant.

The building is a three-story structure on the west side of Park street, facing the southwest. It had been owned by the company for some time but had been rented. On April 1 the company took it over and renovated it throughout for the purpose to which it is now applied. There are accommodations for 27 boys, some of the rooms containing two and three cots, and all available space is now taken, a few

cots being reserved for out-of-town boys, who will occupy them at the close of the high school year.

The institution is known as the Apprentice House, and while under the supervision of the Apprentice Department, it is operated directly by an employe of the company and his wife with the aid of an assistant housekeeper. There are 13 sleeping rooms, a capacious living room, a glassed-in sun parlor, a wash room containing two modern baths and four lavatories, in addition to which there are other lavatories and toilets in various parts of the building.

MISCELLANEOUS

The Providence Auto Tool Company, with **L. A. Benoit**, **Emile Brisse** and **George Wright** incorporators, has been granted a charter under the laws of Rhode Island. They are capitalized at $100,000 and will engage in the manufacture of auto jacks, pumps, accessories, etc., in this city.

**Samuel M. Nicholson,** president of the **Nicholson File Company,** has just purchased a handsome houseboat which has been christened "Four Winds" and expects to spend the summer on it with his family. They will begin their cruise early in July and will visit various places along the New England coast.

**Charles Fox** has filed a statement with the city clerk's office at Pawtucket that he is the sole owner of the **Darling Brass Foundry,** located and doing business at 59 Whittier street. that city.

**The Martin Brass Foundry** has started in business at 799 Eddy street, Providence, handling work in navy bronze, heavy babbitt, acid-resisting bronze gun metal and brass castings.

Presiding Justice Tanner of the Superior Court has appointed **Charles S. Fowler** and **Arthur C. Holdsworth** as receivers for the **Westerly Brass Company.** This action was taken upon the petition of Frederick S. Opie of Westerly. There was no opposition to the appointment of the receivers, and the court fixed the bond in the sum of $15,000.—W. H. M.

## CINCINNATI, OHIO

JULY 6, 1920.

Strikes at the source of production have hit the local trade a rather hard blow in that it continues to keep the supply of raw material far below normal, although the orders on hand in the local establishments continue to mount up.

There is hardly a plant in the vicinity that has not enough orders on hand to keep running for many months to come. When it is possible to get the material the rail difficulties bob up and the delay in shipping is nothing less than frightful, members of the trade in the Queen City assert.

There has been no wavering of prices, either on the upward trend or on the down grade. The market is fairly steady, so far as prices are concerned, and except for the shortage of material the trade hereabouts has little to complain of.

In some of the plants where brass and copper goods are turned out, the strike of machinists has played havoc, seriously interfering with production. This state of affairs has become so serious that the local courts have been appealed to for aid in protecting the workmen who have remained on the job.

There is no disposition on the part of any members of the industry to feel blue about the situation. They all have a cheerful note as to the future of the business and feel that with the advent of fall a change for the better will have entered into the situation.

About 60 members of the local metal polishers union employed in plants where the management refused to grant them a wage scale of 90 cents an hour are on strike.

The **John Douglas Company,** manufacturers of plumbing goods, have obtained an injunction against members of the machinists union to restrain them from interfering with workmen.

The **Lunkenheimer Company,** manufacturers of valves, have applied for a temporary injunction against the members of the machinists union, charging illegal practices in conducting their strike against the company. The company says it employs about 1,400 men normally and has an investment of $3,000,000 in the plant and $1,500,000 worth of orders now on hand in the process of manufacture, which are put in jeopardy. About 900 employes are still at work, it is stated. The company asks that the strikers be restrained from picketing and threatening workers at their homes and on the streets.

The **Thos. J. Nichols Company,** brass manufacturers of Cincinnati, has been incorporated with a capital of $200,000. The incorporators are T. J. Nichol, D. K. Nichol, E. M. Andrew and B. McMillan.

## CLEVELAND, OHIO

JULY 6, 1920.

Practically all branches of the metal industry in the Northern Ohio district apparently have reached the peak of the high demand for their output during the last month. The condition is but a reflection of the general slowing down in demand for virtually every line of product. Opinion among leaders in industry, commerce and general business here differ as to the cause, though a majority lay the reaction to the stimulus given the move toward lower prices by the action of certain eastern retail interests some six weeks ago. Whatever the cause, the result is the same. Big buying has stopped, and this has been reflected all along the line from the consumer to the original manufacturer.

BUILDING TRADE CONDITIONS

The attitude of labor at this time may be said to be the key to the future situation in all business. Reports coming to this city from other centers of indusry, and reflecting notably the construction industry, tend to show that labor in the building trades at least is waking up to the fact that greater production will be necessary, or high wages will mean nohing, as there will be no work. A grand jury inquiry into the productivity in the building trades here shows that the building crafts operatives have not been doing better than 50 per cent production that they did prior to the war. This is stoutly denied by the union leaders in the different crafts, of course, but the point is that the men have not been doing enough work to suit the ultimate consumer, and said ultimate consumer has decided not to build. This has wakened the contractor element, as witnessed by the attitude of the plumbing contractors in refusing the exorbitant demand of journeymen for $12 a day. Up to the present the contractor has been able to pass the higher costs on to the consumer, but the consumer is no longer there to pass it onto, and the result is the plumbing business has come to an abrupt standstill with neither employers or employes closer together on a settlement.

As the building industry can be considered a basis for controlling the entire industrial situation of this community, it will be seen that there is less activity to all industry right now.

COAL SITUATION

On the other hand the shortage of coal, and the threatened curtailment by the company delivering natural gas to plants and domestic consumers of this important fuel, places this trade in an even more embarrassing position than ever. The most encouraging reports on the fuel supply is that it is 45 per cent of normal. It is admitted by the most optimistic that unless there is speedy delivery of coal before the winter plants will be forced to shut down, for though most depend upon gas and electric power from the illuminating company, the public service interests will be unable to meet the greater demands upon them made necessary by the lack of coal.

Indirectly the general slowing down is due to the lack of cars for the transportation of coal and raw materials, and this is but a reflection of the switchmen's and other operatives' strike, still more aggravated in the last few weeks in the East.

AUTOMOBILE TRADE CONDITIONS

Most metal industry plants here depend upon the automobile trade for outlet for their product. Yet two distinct developments have appeared in the last few weeks—a decided falling off in demand for both used and new cars, and prompter delivery of new cars by driving from factories by a number of manufacturers. Where rail shipments of cars has been necessary, de-

livery has been blocked, hence the slowing down in demand upon the metal industry firms here. Some motor car producers are said to expect not better than 35 per cent of their original production planned for this year. Lack of fuel and raw materials is given as the principal cause. Lack of demand is ignored somewhat. But more important of all is the recent attitude of the Federal Reserve Banks in discouraging the absorption of capital into pleasure car manufacture, as well as labor and materials, and the desire to divert these factors into more essential channels.

Still another another reflection that is worthy of note at the moment is the lessened demand for machinery and machine tools. Owners of plants here indicate a desire to await a more favorable market before extending their inquiries for additional equipment, either used or new. Local manufacturers have not raised their prices, though some eastern producers have made increases in the last few weeks.

Individually members of the trade are doing their share toward readjustment. One of the first steps in Cleveland has been that taken by **John C. Campbell,** president of the **Newark Wire Cloth Company,** Newark, N. J., who comes here to interest manufacturers generally in the abolishment of paying time and one-half for overtime, bonuses and the awarding of contracts on a cost plus basis. In an interview with trade paper representatives Mr. Campbell stated that a continuance of these practices will ruin the country in a year, and that they are to blame largely for the present unsettled conditions. His claim is that they introduce an uncertain element into all business, and as such make for increased prices.

Efforts to cooperate more fully with employes by many of the large industrial plants here are being continued, on the ground that stock holding or similar interest in the enterprise will make for increased production returning higher income to both capital and labor employed. Several establishments have gone a step further, however, according to **Hugh Fullerton,** executive secretary of the **H. Black Company,** in seeking to extend their medical, surgical and nursing work at plants to include voluntary physical examinations for employes every six months. The efficiency of the worker, his welfare and happiness is largely dependent upon the industrial establishment nurse, according to **Mr. Fullerton,** and that the nurse has already proved to be one of the most important factors in the industrial plant.

Increased efficient producing labor of the right sort is seen by plant managers here following the opening of the new machine shop school of the Y. M. C. A. here. The school is declared by **P. F. Ellsworth,** director of the school of engineering of the educational department, to be the only one of its kind in Ohio and the best equipped in the world. Fifty machine tools of large calibre have been installed. Much of the equipment has been acquired since its discontinuance for war uses, though new it would have cost $60,000. A system of wages will be devised to assist the students in carrying on their studies. But both men and materials will be turned out by the shop, according to **Robert E. Lewis,** general secretary of the Y. M. C. A. While the mechanical study will be a large part of the course, executive and shop foreman work will be included as well, says **Mr. Lewis. B. J. Papoi** will be shop superintendent.

**The Glauber Brass Company** plant on the north side of Superior avenue from East 49th street to East 51st street, has been leased for a 99 year term by the Paul Brothers, contractors. The Glauber plant originally was the power house of the cable railways that operated cars on Superior and Payne avenues. The Glauber company has a lease for some time on its factory property, and will negotiate an extension.

Second fire in less than two months has again damaged the plant of the **Central Brass Manufacturing Company,** this time with a loss of about $15,000, estimated by W. O. Pepper, vice-president and secretary. The company had only recently resumed operations following remodelling after a fire in May. **E. A. Eckhouse** is president of the company.

## COLUMBUS, OHIO

JULY 6, 1920.

The metal market in Columbus and central Ohio territory is weaker all along the line. The weakness has been gradually developing during the past month and all metals are affected by the transition. Buying on the part of metal using concerns is strictly limited to immediate needs and there is no disposition to accumulate stocks for the future. The tone of the market is not as good as formerly although the declines have not been any more than in other locations.

Uncertainty as to the future is the prevailing feature of the trade. Dealers and shippers are not inclined to take any great chances at present and the public are buying in a limited manner because there is a general feeling that prices will go to lower levels. Copper is holding fairly firm at 17¾ cents per pound for casting. Brass is slightly weaker and sells in the neighborhood of 18 cents for red ingot and 13¾ to 14 cents for yellow ingot. Aluminum is holding fairly steady around 32 cents. Tin is much weaker and the same is true of zinc. Antimony is also showing weakness.

For the first time in central Ohio territory some weakness is apparent in type metals. The demand for that class of metals has also fallen off and consumers are only buying for the present.

The **Oster Manufacturing Company, of Cleveland,** has purchased the property of the Aluminum Castings Co., located on Carnegie Avenue adjoining the plant of the first named concern and fronting on East Sixty-first street. It is planned to improve the new plant by the erection of a five-story building.

**The Gregson Aluminum Foundry Company,** of Cleveland, has been chartered with a capital of $50,000 by Augustus C. Newell, Edwin D. Ruggles, Victor G. Butcher, Richard A. Wilkins and George C. Wing. W. L.

## TRENTON, N. J.

JULY 6, 1920.

The Trenton metal concerns continue busy despite the general conditions brought about by the world war and manage to keep the plants running. The inability to secure raw material from the manufacturers, the slow movement of freight and labor conditions are some of the things the manufacturers have to contend with at the present time. **William G. Wherry,** president of the **Skillman Hardware Manufacturing Company,** told a representative of THE METAL INDUSTRY that despite the handicaps his plant was running along smoothly. "We do not appear to be feeling the effects of things," he said, "except that prices are beginning to soar. The big jump in coke caused an advance in steel, in iron and other products and naturally this hits the copper and brass situation. We are not striving for any extra production, but are merely looking after our customers until business conditions become more settled."

**The Trenton Zinc and Chemical Company,** of Trenton, N. J., has been incorporated with $225,000 capital stock to manufacture and deal in zinc, etc. There are 4,500 shares of $50 each. The incorporators are **Alexander Budson, Philip S. Vine and Allen I. Applebaum,** all of Trenton. The company has opened an office in the American Mechanic Building in Trenton and will shortly select a factory.

Suit has been commenced in the New Jersey Court of Chancery at Trenton by the **Jordan L. Mott Company** to restrain Local No. 140, Metal Polishers International Union, Its officers and members from interfering in any way with the plant or the company's employees in a strike now being conducted against the company. The bill filed states that at the beginning of the trouble the company employed 52 metal polishers; that the concern was neither an open nor a closed shop; that in some departments there were union workers and in others non-union men. It was set forth that prior to the strike the relations of the company with its employees were unusually pleasant. It is then recited that the concern has many valuable contracts which the strike is interfering with.

On April 13 last the polishers and buffers demanded an increase in the hourly rate of pay and a counter proposal by the company was apparently satisfactory and was accepted. The next day, however, the piece workers refused to work an hour extra, as the agreement called for, although the day workers were willing to put in the extra hour. The piece workers were dismissed and the day workers quit. A strike followed.

The bill sets forth that new help was hired and the company would have soon been able to continue its work satisfactorily. About this time an application was made to the United States Department of Labor for a conciliator, and as

a result of his intervention the company agreed to pay overtime to the workers. The men then returned to work. On May 5 last, the company alleges, a committee from the polishers' union demanded the discharge of all the new men as well as those of the older employees who had continued at work during the strike. One of the latter, the company says, has been employed by the concern for about 25 years and was a faithful and conscientious employee.

A strike was declared against the plant on May 6; the plant was picketed, threats and intimidations against the workers were made and some were run away from the place. A number of these alleged instances are noted in the bill of complaint. The company seeks an injunction against the defendants to prevent picketing, promoting, encouraging, directing or participating in the strike, and also to restrain contributions of money or advice to aid the strike or the molestation or annoyance of any of its working people.

**Lewis Aronson,** president of the **Art Metal Works,** Newark, N. J., has purchased the Birkenhauer & Bauman brewery on South Orange avenue. The new owner will use the property as an auxiliary plant of the Art Metal Works at Mulberry and Center streets, Newark, where metal novelties are manufactured. The property measures 122 by 152 feet.

The factory at 60 Elm street, Newark, N. J., formerly occupied by the **Acme Brass Foundry Company,** has been sold to **Louis Weitz,** of Paterson, representing a large brass foundry concern, which will operate it. The property measures 50 by 110 feet and is entirely covered by a modern one-story brick building. The new owner also took over the complete equipment. The property was erected three years ago and was recently vacated by the Acme Brass Company.

**McDowell, Small & McKibben Company** have erected a plant at Fifth and Ebert streets, Camden, N. J., and will employ about 300 workmen in the manufacture of small metal parts, etc.

**Bretscher Manufacturing Company** has leased the entire main floor of the building at 70-72 Marshall street, Newark, N. J., and will use the same for the manufacture of light metal ware.

**The F. & H. Foundry Company,** Berkeley avenue, Newark, formerly the **Franz-Holbrook Bronze Company,** will erect a large factory near Heller field. The appeal board of the city zoning commission approved the application for the new plant.

MUNITIONS SUIT

J. Wesley Allison, of Morrisburg, Ontario, Canada, has brought suit in the United States District Court at Trenton, N. J., against M. Hartley Dodge, of Madison, N. J., for $300,000 as a result of a contract for more than 2,000,000 18-pound shell cases, on which Allison, according to the complaint, was to receive a commission of 15 cents per case. Dodge was a manufacturer of munitions during the war, being connected with the Remington Arms-Union Metallic Cartridge Company. Through William J. Bruff, president of the munition company, Sir Samuel Hughes, Minister of Militia and Defense for Canada, handed out a contract for the cases. Allison's part of the deal, according to the bill of complaint, was to furnish the machinery and tools, for which he was to get a commission. The plaintiff sets forth that Dodge had given power of attorney to Bruff to close the contract. The plaintiff declares that there were in excess of 2,000,000 of the shell cases sold to England and that thus far he has received no commission. He consequently asks for $300,000 with interest from January, 1917, and costs.

The Jewelry business of **Otto O. Stillman,** Albany street, New Brunswick, N. J., has been amalgamated with a new state-wide corporation to be known as **Holt & Company.** Mr. Stillman started in the jewelry business in New Brunswick in 1869 as a watchmaker. The new company has a capitalization of $500,000. Holt & Company have been engaged in business in Newark for many years.

**The New York Wire and Spring Company,** of Jersey City, N. J., has been incorporated with $100,000 capital to manufacture and deal in metal products. The incorporators are **S. A. Black, A. F. McCabe** and **J. R. Turner,** all of Jersey City.

**The Vulcan Detinning Company,** of 15 Exchange Place, Jersey City, N. J., has filed with the secretary of state at Trenton a certificate increasing its capital stock from $3,500,000 to $5,646,000 by creating 9,200 shares of 7 per cent. cumulative preferred stock at a par value of $100 per share and 12,260 shares of common stock at $100 per share at par. The value of the created preferred stock is $920,000 and the common stock is $1,226,000.

**Francis J. Currie,** of 55 South Munn avenue, South Orange, died recently after an illness of three months. He was born in New York forty-six years ago. He was connected with the can manufacturing business nearly all his life and at the time of his death was sales manager of the **Continental Can Company.** The deceased is survived by a widow and three sons.

## LOUISVILLE, KY.

JULY 6, 1920.

There is a steadily increasing demand for aluminum castings, metal work, etc., especially in connection with the automobile industry, and some enlargement of accommodations for manufacture of aluminum goods is in sight.

Labor is a bit scarce, but is obtainable, although it is reported that it is not at all easy to secure the kind of labor that is needed on better grades of work. Prices are high and show no signs of receding; there have been some recent advances in prices paid to foundrymen.

**Hines & Ritchey** and the **Standard Milk Machinery Company,** allied concerns, have purchased a new plant at 15th and Madison streets, which is now being remodeled and will be ready for occupancy within a month or so. This is a good brick building, well located and considerably larger than the old plant.

The **Hart Manufacturing Company,** manufacturers of brass, iron and other metal goods, has moved from 15th and Madison streets, to one of the old Bridgeford foundry buildings at 16th and High streets.

The recently incorporated **Monarch Brass Works, Charles F. Grainger** and others, will be a subsidiary of **Grainger & Company,** operating an iron foundry, and also putting out structural steel and other lines.

Announcement has recently been made to the effect that the **Peerless Manufacturing Company,** 15th street and Ormsby avenue, is planning installation of additions, probably a stove foundry. The company manufactures a line of iron, brass, oxidized and other fireplace fixtures or hardware.

The **American Motorcycle Manufacturing Company** has purchased a former Government-owned building on Underhill street, and will install a plant for manufacturing and assembling motorcycles. The company will be considerable purchasers of brass and aluminum parts.

Articles of incorporation have been filed by the **Louisville Aluminum & Brass Foundry,** capital $60,000, to manufacture general lines of aluminum and brass products, operating a casting foundry. **Elmore Sherman,** of the **Vendome Copper & Brass Works,** is one of those pricipally interested in the new concern, **W. O. Bonnie, Jr.,** and **E. Emmett Kirwan** being the other incorporators.

**The Gray Company,** of Louisville, backed by Chicago interests, has been incorporated, with a capital of $100,000, to manufacture paper and metal goods, it being understood that the company will produce office specialties, although announcement has been withheld pending purchase of plant site. **J. B.** and **M. S. Gray,** Chicago, and **John B. Hampton,** Louisville, are named.

**The Stitzer Manufacturing Company,** Louisville, to manufacture metal specialties, including a patented light holder, has been incorporated, with a capital of $10,000, by **David B.** and **Oscar B. Stitzer** and others.

**The Perfection Sterilizer Company,** Louisville, capital $300,000, to manufacture and assemble steam sterilizers for restaurants, barber shops, dental offices, etc., has been incorporated by **W. E. Crutcher, H. O. Wieland, J. C. Darnall** and others. It plans to do an assembling business at Louisville at the start.

**Harry T.** and **Roy C. Whayne,** doing business as the **Roy C. Whayne Supply Company,** handlers of general lines of machinery at Louisville, have filed injunction proceedings

against the **Wayne Machinery Company,** Ft. Wayne, Ind., which has recently officed a competing branch at Louisville. The local concern claims that the newcomer is infringing on a priorally established name and has injured its business.

**B. F. Avery & Sons,** Louisville manufacturers of plows, implements, harvesting machinery, etc., has denied reports to the effect that it is considering a merger with the **Avery Company,** of Peoria, Ill., stating that it sells goods to the latter concern, but has not even considered such a deal as that reported.

With high heat unit gas coal now costing around $10 a ton at the eastern Kentucky and West Virginia mines, it is claimed that coke and all other grades of heating fuel are advancing, and will further advance the price of metal goods. Oil prices are also showing steady advance.

## SAN FRANCISCO, CAL.

JULY 1, 1920.

San Francisco assumed the importance of the silver capital of the world at the conference on June 11, in San Francisco, of producers, ore purchasers and refiners, and vendors, called by Raymond T. Baker, Director of the Mint. Many authorities state that the presence of Baker in San Francisco and his action in calling the conference averted a panic in the silver market, as the silver producers are now in a position to take full advantage of the dollar base price for silver under the Pittman act, when the London "fixed" price was far under 90.

As soon as news of Baker's action in calling the conference was flashed over the globe, the price of silver jumped on the New York market from 87 to 92, and on the San Francisco exchange to 94.

Director Baker explained to those attending the conference the silver situation during the war, and the causes for the enactment of the Pittman bill. He stated that he is ready to purchase 207,000,000 ounces of silver produced and reduced in the United States at $1 per ounce, 1,000 fineness. This contract would keep the producers busy for a period of ten years to fill and probably a longer time would be necessary to carry out the order, he said, if the price ascends to $1.

It was emphasized that the smelters could not practically segregate and refine separately each shipment of ore, due to the various characters of the ores and the prohibitive expense and delay in such an operation, by Director Baker, E. B. Braden, general manager of the American Smelters; Frank Manson, manager of the Western Ore Purchasing Company, and Henry Rives, secretary of the Mine Operators' Association. The affidavit of the smelter accompanying each bar of bullion is accepted evidence of the American origin and reduction of that quantity of the silver. Responsibility of separating and stamping only the number of bars that conform to the receipt of an equal quantity of United States produced silver and furnishing the affidavit is assumed by the smelters.

On account of the long time consumed in ore treatment, the smelters will be permitted to prepare affidavits on all silver handled for the past five months.

In some circles there is liable to be a scramble to examine bullion cars now in storage to establish the "affidavit" bars, which, properly identified, will carry the Pittman price, and the "non-affidavit" and foreign bars which will be valued at the open market price.

Only one important matter remains to be settled to put the plan in full operation, the adoption of a satisfactory form of negotiable affidavit to accompany all bars of bullion subject to the Pittman act, and all sworn statements from the producers. Director Baker appointed the following committee to submit the affidavit form: Frank Manson, Thomas M. Patterson, E. B. Braden, John G. Kirchen and Henry M. Rives.

The tenth annual convention of the California Gold and Silversmiths' Association opened at San Jose, on June 11. George Feagons, Los Angeles, president of the association, presided.

### METAL TRADES ASSOCIATION SEEKS TO STOP MISTREATMENT OF EMPLOYES

The California Metal Trades Association has announced that it will pay a reward of $1,000 for information which will lead to the arrest and conviction of any person attacking any of the 25,000 men in the employ of any shipyard, manufacturing plant or commercial shop who is a member of the association.

The association claims that the reward has been necessary due to the fact that city authorities have failed to curtail the wholesale attacking of workers by alleged strikers. The association claims that it has reported more than 100 violent assaults up to March 27 and that fifty-three men have been severely beaten since that date. Reports of the Chief of Police, Police Commissioner, Mayor and Grand Jury have failed to curtail the attacks, the association alleges.

Conditions have not been bettered and attacks are as numerous as ever, claims the association, and gives this as its reason for deciding to offer the $1,000 reward.

## BIRMINGHAM, ENGLAND

JUNE 22, 1920.

Manufacturers in the metal trades are profiting just now by the low prices of metals. Last week a critical position in the metal market was reached. Speculators in tin who bought in the early months had huge differences to make up, equal in many instances to what in pre-war days was the full price of the metal. Other metals, copper especially, were affected, and the partial recovery last week was followed by a rapid downward movement as the result of forced realizations to cover the differences in tin. So serious had the crisis become that the chairman of the London Metal Market announced that a guarantee fund had been started which would insure all liabilities of members of the ring being met. Zinc has since shown a slight recovery, but some of the English producers are closing their works, being unable to manufacture profitably at present prices. For a similar reason the Cornish tin mines are being closed. Both home and export demands for manufactured goods are slackening, the former on account of high prices and the latter, as regards European countries, because of difficulties of international finance. Orders for brass founders' work have fallen off a good deal during the past month, but most firms will be busy for months to come on arrears of work. The rolling and tube mills have so far experienced no slackening of business.

The National Brass & Metal Mechanics' Society (until recently known as the Amalgamated Brass Workers) held its annual conference in Birmingham at Whitsuntide. The membership reported was 35,400, an increase of 6,400 on the year, and the number of branches has increased from 69 to 80. W. C. McStocker as national vice-president and J. Ramsden as national vice-president were again re-elected. The conference decided that a determined attempt should be made at the earliest possible moment to eliminate female labor from the brass trade. The society's representative was instructed to press for improved health provisions and washing facilities in the metal polishing shops.

The members of the society throughout the kingdom, concurrently with the Amalgamated Society of Engineers and fifteen other trade unions, recently balloted on the general adoption of the principle of payment by results. The vote, as was also that of the other unions concerned, was against the proposal. There has also just taken place a ballot of the society upon the proposal for fusion with the Amalgamated Society of Engineers and other large trade unions. This was the second ballot on the subject, the requisite proportion of the members, 50 per cent, not having voted. The second vote has also proved inconclusive. The vote in favor of the proposal was 10,504 and against 10,199, but a 20 per cent majority was required to carry it. The National Brass and Metal Mechanics' Society, and, for similar reasons, certain other large unions will drop out of the scheme. Nine of the seventeen unions balloted have declared for amalgamation and the new constitution, which provides for a very close federation, will come into force in July. Among the unions amalgamating are the Amalgamated Society of Engineers, the United Machine Makers, the Instrument Makers, the North of England Brass Turners, Fitters, Finishers and Coppersmiths, and the London United Brass Finishers.

The workmen in the Birmingham jewelry and allied trades have made application for a general increase of 10 shillings a week. The present state of trade is not such as to put employers in a conceding mood, and the men, many of whom are on short time, have not had the courage to put their threat of strike into operation. A year or two ago a Joint Industrial

Council was formed for the trade, but this is now in a state of suspended animation. There are two rival unions, one of which, formed specially for the Birmingham jewelry trade, was denied representation by the section of the work-people connected with the national organization. The Birmingham employers consequently withdrew from the Board and the Sheffield employers followed their example. Negotiations in the present dispute have been conducted on behalf of the employers by the Birmingham Jewelers' and Silversmiths' Association. A conference with the men last week resulted in an offer of increases of 7/6d. per week to unskilled workers, 5/ to semi-skilled workers, and 8/4d. to skilled men. This offer is under consideration by the men and will probably be accepted. Business in the old departments of the industry has fallen off considerably during the last two or three months. Trade in silver goods has also slowed down. Good progress, however, is being made in the manufacture of goods lending themselves to machine production and a number of new plants have been put in.

## VERIFIED NEWS OF THE METAL INDUSTRY GATHERED FROM SCATTERED SOURCES

**The Egyptian Lacquer Manufacturing Company** has moved to 5 E. 40th street, New York City.

**The New Jersey Brass Corporation** has changed its address from 61 Broadway to 480 Lexington avenue, New York.

**The Roessler and Hasslacher Chemical Company,** New York City, announce the removal of the Chicago office from 111 W. Washington street, to 589 E. Illinois street.

**The American Mirete Corporation,** New York, has been incorporated with a capital of $125,000 by A. G. Kent, 106 West 52nd street, and others, to manufacture metal products.

**The Falcon Bronze Company,** Youngstown, Ohio, has increased its capital from $25,000 to $200,000. They operate a brass and bronze foundry, brass machine shop and casting shop.

**The Wood-Embly Brass Company,** Waynesboro, Pa., whose foundry was burned on April 17, are again at work in a new shop. They operate a brass, bronze and aluminum foundry and have installed a furnace for aluminum exclusively, as aluminum patterns are their main work.

**The Grand Rapids Brass Company,** Grand Rapids, Mich., recently increased its capital from $500,000 to $1,250,000. They operate a brass and bronze foundry, brass machine shop, tool room, grinding room, stamping, galvanizing, plating, polishing and lacquering departments.

**The Royal Metalware Manufacturing Company,** Denton, N. C., are preparing plans for a building 100 x 150 feet, for the manufacture of aluminum kitchenware, fireless cookers, etc. Prices are wanted on presses, dies, lathes, etc. J. L. Snyder is treasurer. They operate spinning and polishing departments.

**Dick Bros.'** brass foundry, 3rd and Buttonwood streets, Reading, Pa., was damaged recently by fire. The loss is estimated at $5,000. This company operates a brass, bronze and aluminum foundry, brass machine shop, tool room, grinding room, soldering, plating and polishing departments. Geo. W. Miller is president of the firm.

**The Monarch Aluminum Ware Company,** 4613 Payne avenue, Cleveland, Ohio, have awarded the contract for the construction of a one-story, 50 x 143 feet factory addition to H. G. Claxton, Vickers Building. Cost about $50,000. They operate an aluminum foundry, tool room, spinning, stamping and polishing departments.

**The Akron Brass Manufacturing Company,** Wooster, Ohio, has awarded a contract to J. C. Smythe, Wooster, for a one-story machine shop and brass foundry, 40 x 185 feet, to cost with equipment about $150,000. They operate a brass and aluminum foundry, brass machine shop, tool room, grinding room, plating and polishing department.

**The Dixie Brass and Foundry Company,** Birmingham, Ala., is planning the erection of a machine shop on Sixth avenue and 12th street. Cost about $50,000. They have increased their capital from $15,000 to $100,000. They operate a brass, bronze and aluminum foundry, grinding room and brazing department. They also make gray iron, wood and metal patterns and models.

**The U. S. Copper Products Corporation,** of Cleveland, Ohio, announces the opening of a New York office at 1123 Broadway, for the sale of seamless brass and copper tubes, under the management of Herbert Gnad. This concern operates a smelting and refining department, brass machine shop, tool room, grinding room, casting shop, rolling mill, cutting-up shop and tinning department.

**The Inter-Racial Council** has established an information service for the benefit of employers of foreign born labor and for the workers themselves, in the Woolworth Building, New York City. While helping to stabilize immigrant labor, this service is in line with their effort for the welfare of the foreign born by promoting better relations between the various races in America and the native born.

**The Lamberson Japanning Company,** 2334 W. Kinzie street, Chicago, Ill., whose large plant was totally destroyed by fire last January, are again operating in their new plant at the same address. They are specializing on large production of black finishes by the dip process, having equipped their new plant with the best mechanical devices obtainable. W. J. Miskella is president of the company.

**Bearing Metals, Ltd.,** recently incorporated, with offices in the Dominion Express Building, Room 316, Montreal, Canada, have acquired the plant of the Lion Metal Company, Cote St. Paul, Que. They will manufacture babbitt metal, solder, etc. E. L. W. Saunderson, formerly manager of the Magnolia Metal Co., is vice-president and general manager. They operate a smelting and refining department.

The organization of the **Gorman Metal Company, Inc,** 141-145 Clara street, San Francisco, Calif., has been announced by E. L. Reese, president, G. Lienau, secretary & treasurer and D. W. Gorman, vice-president and general manager. They manufacture a full line of babbitt metals, bearing metals, solder, type metal alloys, etc. They also deal in tin, lead, antimony, zinc, copper, aluminum, zinc plates, brazing spelter, etc.

**The American Metallurgical Corporation,** Franklin Trust Building, Philadelphia, announce the closing of a contract with the Thermoid Rubber Company, Trenton, N. J., for the installation of electric oven equipment to take care of the production of a specially processed product to be placed on the market by this company. The installation involves a number of new principles specially pertaining to solvent recovery and automatic control of heat temperatures.

At a recent meeting of the Board of Directors of the **Watson Stillman Company,** New York City, several changes in personnel were made, due to the retirement of Mr. A. F. Stillman from active interest in the management.

Mr. E. A. Stillman remains as president of the company, and also has full supervision of the sales. Mr. Carl Wigtel, chief engineer, was elected vice-president, Mr. J. D. Brooks, treasurer, and Mr. A. Parker Nevin, secretary. Mr. LeRoy T. Brown was appointed works manager, Mr. J. Delane, assistant works manager and Mr. W. H. Martin purchasing agent.

Under this arrangement the offices of general manager and superintendent are discontinued, and Mr. G. D. Kershaw and Mr. J. F. Lary, who held the positions, are no longer connected with the company.

**The M. L. Oberdorfer Brass Company,** Syracuse, N. Y., have purchased 19½ acres at Eastwood near Syracuse, and are erecting a new plant. Site, buildings and equipment will cost $800,000. They manufacture brass, bronze and aluminum castings, operating foundry and brass machine shop. They employ at present 450 people. At Eastwood the company

will occupy 130,000 square feet. Moses L. Oberdorfer is president and Joseph L. Goodman secretary of the company.

**The Hausfeld Company** and **Campbell Brothers Manufacturing Company,** of Harrison, O., have consolidated their business interests and will operate under the name of the Campbell-Hausfeld Company, effective July 1, 1920. They will continue to manufacture Hausfeld Metal Melting Furnaces and other foundry specialties, as well as the Campbell Corn, Cotton and Peanut Planters. E. B. Hausfeld, Pres.; A. M. Campbell, Vice-Pres.; Jas. E. Hausfeld, Treas.; C. E. Haddock, Secy.; H. O. Campbell, Purchasing Agent; J. S. Armour, Sales Dept.

**The Farrel Foundry and Machine Company,** Ansonia, Conn., manufacturers of chilled rolls and heavy machinery, have acquired the Black Rock plant of the Bethlehem Shipbuilding Corporation in Buffalo, the property of the Navy Department. They will carry on the same line of work at this Buffalo plant that they do at Ansonia, with the lighter work done at Buffalo, which is equipped with lighter cranes. The Buffalo plant is 200 x 725 ft., has four bays equipped with 12 traveling cranes, a power house, etc. Frank Farrel Jr., first vice-president, states that his company may either take on some new lines if the present rush in its standard lines lets up, or expand present lines to utilize all the capacity gained by both plants in operation. A. G. Kessler is manager of the Buffalo plant.

**Presto Electro Plating Company,** has purchased the plating plant of F. E. Totten & Son, 97 Cliff street, New York City. They are now located at 22 Cherry street, New York City, and are in a position to do all kinds of plating work—plumbing supply work, phonograph, automobile parts, boat and hotel work. They do plating of Gold, Silver, Brass and Copper. Nickel plating on Die Cast Work and Barrel plating and Tumbling are their specialties, but they are able to handle Silver Work in large quantities and they are especially prepared for contract work. There are sixteen polishers, who work in a room separate from the plating room, thereby enabling them to keep the work clean. With 5,000 square feet of floor space there is ample room for the tanks which are large enough to handle all varieties of work. Mr. Roger Castellani, one of the members of the firm, was formerly connected with Shapiro & Aronson, one of the largest chandelier shops in New York City.

## THE FUTURE LOOKS GOOD

The United States has only 6% of the population of the world and only 7% of the land, and yet we produce:

20% of the world's supply of gold.
25% of the world's supply of wheat.
40% of the world's supply of iron and steel.
40% of the world's supply of lead and silver.
50% of the world's supply of zinc.
52% of the world's supply of coal.
60% of the world's supply of cotton.
60% of the world's supply of copper.
60% of the world's supply of aluminum.
66% of the world's supply of oil.
75% of the world's supply of corn.
85% of the world's supply of automobiles.

## INQUIRIES AND OPPORTUNITIES

**Inquiry 2588—Who makes "Carbolosite?"**
**Inquiry 2590—Who makes the "National" molding machine?**
**Inquiry 2591—Where can I get fittings for banjos, mandolins, etc.?**
**Inquiry 2592—Who makes automatic polishing machinery?**
**Inquiry 2593—Where can I get Cryolite?**
**Inquiry 2594—Who makes steel butted tubing, small sizes?**
**Inquiry 2595—Who makes briquetting or scrap metal baling machines?**
**Inquiry 2596—(Goteborg, Sweden)—Who makes machinery for burnishing silver-plated spoons and forks with steel and blood-stone burnishers?**
**Inquiry 2597—We wish to subscribe, and are interested in brass foundry equipment advertisements.**
**Inquiry 2598—We want for shipment to India second-hand rolling mill equipment with mold-foundry attached for re-melting and rolling brass and copper sheets.**

## TRADE PUBLICATIONS

**Crucibles**—The new catalogue of the Ross-Tacony Crucible Company, Tacony, Pa. It gives sizes, prices and instructions for handling, and shows many special shapes of crucibles.

**Ajax Bull Bearing Alloy**—Issued by the Ajax Metal Company, Philadelphia, Pa., giving the characteristics and advantages of their bearing metal.

**Mineral Resources of the United States in 1918.** —A preliminary report issued by the U. S. Geological Survey with an introduction by Edson S. Bastin. Statistics assembled by Martha B. Clark.

**Industrial Illumination**—A very fine catalogue showing unusually interesting interior photographs of industrial plants using the illuminating system of the Cooper-Hewitt Electric Company, Hoboken, N. J.

**New Truths and Old Fallacies**—A booklet on white metal alloys, babbitt metals, etc., issued by the Magnolia Metal Company, 113 Bank street, New York City. It contains much valuable information about this complex and none-too-well understood subject.

**General Fireproofing**—A house organ issued by the General Fireproofing Company, Youngstown, Ohio. Well illustrated with panoramic views, sketches and detailed drawings, showing applications of fireproof construction to industrial housing projects.

**Low Pressure Expansion Joint**—Bulletin No. 1010, issued by Griscom Russell Company, 90 West street, New York City, covering the G-R Expansion Joint. The bulletin gives specifications, dimensions and a list of specialties manufactured by this company.

**Forced Draft**—The house organ issued by the employees of the George A. Fuller Company, Carolina, Ship Yard, Wilmington, N. C. The brightest and best written house organ that has come to our attention. It is cheerful, newsy, and contains considerable information.

**White Metal Furnaces**—A folder issued by the Rowell Manufacturing Company, Appleton, Wisconsin, showing their Newway bottom draw melting furnaces, white metal ladles, and also various babbitts of their manufacture. Also a folder explaining the "Samson" and "Rowell" car movers.

**American Electro-Platers' Society**—The program of the 8th annual convention held in Rochester, June 30th,-July 3rd, 1920. A very well arranged and attractive publication with considerable advertising. It compares favorably with programs and publications issued by much larger and older societies.

**Tumbling Barrels**—A new catalogue issued by an old concern, Henderson Bros. Company, Waterbury, Conn., explaining and illustrating tumbling barrels for various purposes. It is neatly arranged and shows a varied line of barrels for numerous purposes which should be very useful for foundries, plating and finishing plants.

**Like Finding Money**—A booklet issued by the Famous Manufacturing Company, East Chicago, Indiana, on baling presses for all purposes; it illustrates the "Famous" and "Champion" presses, which are used in numerous industries, including sheet metal, wire, etc. These presses are manufactured in their own plant under basic patents.

**Japanese Catalogue**—A catalogue, issued by the General Commercial Company, Ltd., Yokohama, Japanese agents of the Wright Manufacturing Company, of Lisbon, Ohio. Their product consists of Hoists only, and the catalogue in question is printed in Japanese. Mr. Wright is authority for the statement that in foreign countries there is a distinct tendency to favor those American Manufacturers who specialize in one product.

The catalogue presents an odd appearance with the title page at the back, and the vertical colums of hieroglyphics. The catalogues are, of course, intended for distribution in the Japanese Empire.

**Automatic and Semi-Automatic Furnaces for the Continuous Heat-Treatment of Metals**—Bulletin 217 issued by the W. S. Rockwell Company, New York City. This bulletin is a review of methods and equipment that they have developed in recent years and which have in practice shown their value. The great variety in manufacturing requirements and working conditions makes difficult the standardization of

methods or equipment, though the application of some of the essential factors may be of interest to the manufacturer anxious to improve the quality and decrease the cost of his heated product.

**Bituminous Coal**—Bulletin No. 3, published by the Federal Trade Commission, furnishing current information on the cost of production of coal. The statistics are compiled from monthly reports made by operators on the commission prescribed cost forms. Preliminary monthly figures, similar to those in this bulletin, will be issued for succeeding months, as soon as possible after the receipt of the operators' reports. Final and more comprehensive figures will be issued quarterly. Usually these will modify the preliminary figures but slightly. The object of the bulletins, furnishing preliminary statistics, is to make public the essential facts concerning the changes of cost with least possible delay.

## METAL STOCK MARKET QUOTATIONS

| | Par. | Bid. | Asked. |
|---|---|---|---|
| Aluminum Company of America | $100 | $600 | $700 |
| American Brass | 100 | 195 | 200 |
| American Hardware Corp. | 100 | 135 | 140 |
| Bristol Brass | 25 | 26 | 29 |
| International Silver, com. | 100 | 30 | 40 |
| International Silver, pfd. | 100 | 88 | 95 |
| New Jersey Zinc | 100 | 198 | 203 |
| Rome Brass & Copper | 100 | 130 | 140 |
| Scovill Mfg. Co. | 100 | 390 | 410 |
| Yale & Towne Mfg. Co. | .. | 270 | 285 |

Corrected by J. K. Rice, Jr., & Co., 26 Wall Street, New York.

## METAL MARKET REVIEW

WRITTEN FOR THE METAL INDUSTRY BY W. T. PARTRIDGE

### COPPER

Sales of refined copper in June were again small, being estimated at 75,000,000 pounds, including export transactions. Sales during the second quarter of the year were approximately 240,000,000 pounds against transactions of 650,000,000 pounds during the first quarter. It is quite evident, therefore, that notwithstanding the dullness in the last sixty or ninety days that sales during the first half of the year have been quite satisfactory, being close to 890,000,000 pounds, which is only 10,000,000 pounds less than the estimated output of refined metal during the same period.

The June output of the United States smelters is estimated at 115,000,000 pounds, indicating that the total output of crude copper in this country during the first half of the year was a little over 700,000,000 pounds. Imports during the same period have averaged close to 37,000,000 pounds a month, or a total of nearly 222,000,000 pounds which added to the smelter output of the United States indicates that refiners have had supplies of approximately 922,000,000 pounds to draw upon, but even if traffic and labor conditions deprived the refineries of a part of this copper, they still had surplus stocks from last year to draw upon.

Domestic consumption during the first half of the year is estimated at 700,000,000 pounds, there having been a sharp falling off in melting in May and June because of strikes, scarcity of fuel and unfavorable traffic conditions. Exports, with June estimated, during the first six months of the year were close to 400,000,000 pounds. The indication, therefore, is that domestic and foreign consumption exceeded production by 200,000,000 lbs.

The general opinion in regard to copper toward the end of June, was that unsatisfactory conditions had touched bottom, there being no reason, however, to expect any great improvement until the uncertain conditions prevailing should show decided improvement. Meanwhile, basic conditions in copper are sound. There can be no doubt of large accumulating demand which will develop into a new buying movement of considerable proportions, as soon as the unsettled business situation becomes more satisfactory—transportation, credits, strike, the political horizon, etc. Prices declined under the adverse conditions, producers' quotations for prompt and third quarter, toward close of month, being 19c., as compared with 19.25@19.50c. for electrolytic on June 1. In the outside market, at the beginning of the month, prompt prime Lake was held at 18.75c.; electrolytic at 18.12½c. and casting at 17.75c. On June 28 these prices were off ¼c. per pound to 18.50c. for prime Lake, 17.87½c. for electrolytic and down ⅛c. per pound on casting copper to 17.62½c. Encouraging developments noted toward the close of June were the greater interest being shown by domestic consumers in future shipments and in the fact that exports were known to be increasing rather than otherwise. Although the total outgo from Atlantic ports amounted to only 1,500 tons, full returns are likely to show at least 25,000 tons outgo. One trade estimate, computes exports during first six months 1920, amounting to approximately 180,000 tons, making the monthly average of foreign shipments about 30,000 tons, which is more than double the average monthly outgo during first half of 1919.

### TIN

The tin market in June opened with a decline to 51.50c. for spot Straits and 51.25c. for metal at dock. American pure, at the same time, was 51.25c. for spot, Banca being held at 49.75c. on dock, and 99 per cent. spot tin at 50.50c. The decline continued gradually, at intervals, following the break in silver, to the lowest on June 16, when Straits spot metal was 45.50c., Straits at dock, 45.37½c.; Banca and American pure, each 45c., and 99 per cent. tin at 43.50c. Immediately following, there was a recovery, which by June 22 had carried to within 1c. per pound of prices at the beginning of the month, Straits spot being now quoted at 50.50c. per pound. Then a reaction at London and in Singapore occurred, and there was a recession here to 46.50c. for spot Straits. Fluctuations continued rapidly, however, and on June 28, prices showed a net decline of only 1.75c. per pound with spot Straits quoted 49.25c.; American pure, 48.50c.; Banca, 47c., and 99 per cent. metal, 45.50c. per pound. Heavy arrivals, 2,380 tons at Atlantic ports and 900 tons at Pacific Coast, gave assurance that large supplies continued available. The lack of demand from consumers reflected only the prevailing condition in all industry, not being the result of anything especially confined to tin.

### LEAD

With but small improvement in the general business situation, during June, the lead market continued its downward trend in prices, the leading interest cutting its basis upon two occasions—from 8.25c. East St. Louis, 8.50c. New York at the beginning of the month to 8.00c. East St. Louis, 8.25c. New York on June 15, and then to 7.75c. East St. Louis, 8.00c. New York on June 17, after which its basis was unchanged. In the outside market, prices, after being held at the May closing 8.55c. East St. Louis, 8.90c. New York for prompt and June, until the American Smelting & Refining Company, reduced its basis, followed that lead and gradually prices receded to 8.15c. East St. Louis, 8.50c. New York, these figures making the spread between the two markets ½c. per pound on June 22. These quotations remained unchanged until June 28, when there was a recovery of five points to 8.20c. ast St. Louis, 8.65c. New York. The advance was due, rather to decreasing supplies than to increased buying, consuming demand having really fallen off because of uncertain conditions. Total decline in the basis of the leading interest was ½c. per pound, while the net decline in the outside market was but 35 points.

### ZINC

The zinc market held its own fairly well during June, fluctuations being within a narrow range, the highest being established at 7.70c. East St. Louis, 8.05c. New York for prompt, June and third quarter positions, inclusive, at the beginning of the month, and remaining unchanged until June 10, when a gradual recession began due to absence of buying interest. This recession had carried, by June 18, to the lowest point when quotations were 7.35c. East St. Louis, 7.70c. New York. On June 21 and 22, however, the advance at London, combining with some domestic demand brought about an advance of 15 points to 7.50c. East St. Louis, 7.85c. New York. A week later, East St. Louis was

up to 7.55c. and New York to 7.90c. for prompt, July, August and September deliveries. This, despite a decline in the meantime at London, indicated one of several things—decreasing supplies, better domestic buying or strong control of the market, any one of which reasons singly, or the three combined, would account for it, the trade seemed to regard the result as being due to combination of influences.

## ALUMINUM

There was no change of any kind in the aluminum market during June. Producers' schedule for 1920 was established early in the year at 33c. for virgin 98-99 per cent., 31.50c. for No. 12 and 44.20c. for sheet 18ga and heavier. In the outside market, 98-99 per cent. metal virgin ingots continued to be held at May prices, also remelted 98-99 per cent. at 31.00-31.50c. and No. 12 remelted at 29.50-30.50c. per pound throughout the month. While some difficulty was experienced in making shipments, this was wholly due, as in the case of other metals, to the bad traffic situation and not to anything else.

## ANTIMONY

As was the story of antimony in May, so it continued throughout June. Large supplies, lack of demand and falling prices. The decline was from 8.80c. on June 1, for wholesale, duty paid New York for prompt and June to 7.50c. on June 28, the decline amounting to 1.30c. per pound, as compared with the decline in May amounting to 1.12½c. Since January, when prices touched 11.25c., there has been a total decline of 3.75c. per pound. Jobbing business also was light in June, being transacted at the usual ⅛c. to ¼c. per pound premium over prevailing wholesale rates.

## SILVER

The silver situation in June was complicated by the establishment of a dual market, there being one price for silver mined and smelted in the United States and another for metal of foreign origin. This was made necessary by the provisions of the Pittman act, passed during the war, to enable this country to meet the overwhelming demand for silver from the Far East, and which threatened to become an alarming situation as a result of the war, if not met. Through the passage of this measure, it became lawful to melt and export silver dollars held in the United States Treasury; the Government agreeing to replace all silver used in this way by purchases, at not less than $1.00 per fine ounce from silver mined and smelted in the United States. London having hitherto established the world price of bar silver, when that price broke on June 16, to 80c. per ounce, quotations for silver of domestic origin and for silver of foreign origin were made. On that day and throughout the remainder of the month, domestic bar silver was quoted at 99½c. per ounce. Silver of foreign origin, which was quoted at 99½c. on June 1, and which had declined to 80c. on June 16, had recovered to 92½c. on June 21 and again on June 23, declining afterward to 90c. On June 28, an advance was made to 93c. By the maintenance of the price of domestic silver at $1.00 per fine ounce, production in this country is encouraged. Purchases made by the United States Government for replacing its exported silver, were reported late in June as being $1,700,000, authority having been given to the mint to buy a total amounting to $207,000,000.

## QUICKSILVER

Because of depleted supplies, the price of quicksilver rose $13 per flask of 75 pounds to $93 in two successive advances during first week of June, the first of which was from $80 to $87 on June 4, and the second to $93 on June 8. This price remained until June 14, when considerable supplies having arrived in the meantime, there was a decline to $90, making the net rise $10 per flask of 75 pounds. Demand for quicksilver is steady.

## PLATINUM

The decline in price of platinum which has been going on for several months, in June, amounted to $10 per ounce from $95 June 1, to $85 on June 17, there being no further change up to June 28. The general opinion in trade circles was that while a further decline might take place later, it would not occur until existing supplies were increased, in view of the well sustained demand for the metal.

## OLD METALS

Generally uncertain conditions in the business world continued throughout June, being reflected in further depression of prices in old metals. After some improvement during the middle two weeks of the month, a further outcropping of strikes in the closing days, hampered shipping facilities. Total declines in copper were ¾c. each, on light to 13c. and on strictly crucibled to 15c., while uncrucibled wire was off ½c. to 14.50c. Composition scrap also declined ¾c. to 14.25c. Cocks and faucets, and light brasses each declined 1c. to 11c. for the former and to 7c. on the latter. Among aluminums, prices were well maintained, the only change being ½c. on old sheet, to 23c. per pound. No. 1 pewter netted a 2c. decline to 31c.; tea lead, ½c. to 4.50c., and brass turnings, ¼c. to 8.50c. The only net advance on the entire list, was ¼c. per pound on new zinc scrap, to 6.75c. The outlook was for continued small business, until general conditions were improved.

## WATERBURY AVERAGE

Lake Copper. Average for 1919, 19.55. 1920—January, 19.25. February, 19.125.—March, 18.875.—April, 19.125.—May, 19.00.—June, 18.50.

Brass Mill Zinc. Average for 1919, 8. 1920—January, 9.75. February, 9.40.—March, 9.15.—April, 8.85.—May, 8.30.—June, 8.15.

## JUNE MOVEMENTS IN METALS

| Copper: | Highest. | Lowest. | Average. |
|---|---|---|---|
| Lake | 18.75 | 18.25 | 18.5455 |
| Electrolytic | 18.125 | 17.75 | 17.9659 |
| Casting | 17.75 | 17.50 | 17.6478 |
| Tin | 51.50 | 46.50 | 48.625 |
| Lead | 8.90 | 8.50 | 8.7396 |
| Zinc (brass special) | 8.20 | 7.85 | 7.9273 |
| Antimony | 8.80 | 7.50 | 7.9341 |
| Aluminum | 32.50 | 31.50 | 32.00 |
| Quicksilver (per flask) | $93.00 | $80.00 | 88.909 |
| Silver (cts. per oz.) | 99.50 | 80.00 | 90.8173 |

# Metal Prices, July 6, 1920

## NEW METALS

| | Cents. |
|---|---|
| **COPPER—DUTY FREE. PLATE, BAR, INGOT AND OLD COPPER.** | |
| Manufactured 5 per centum. | |
| Electrolytic, carload lots | 18¼-19.00 |
| Lake, carload lots | 18½ |
| Casting, carload lots | 17¾ |
| **TIN—Duty Free.** | |
| Straits or Australian, carload lots | 49.00 |
| **LEAD—Duty Pig, Bars and Old, 25%; pipe and** | |
| Sheets, 20%. Pig lead, carload lots | 8-8.60 |
| **ZINC—Duty 15%.** | |
| Brass Special | 8¼ |
| Prime Western, carload lots | 7.95 |
| **ALUMINUM—Duty Crude, 2c. per lb. Plates, sheets, bars and rods, 3½c. per lb.** | |
| Small lots, f. o. b. factory | .... |
| 100-lb., f. o. b. factory | .... |
| Ton lots, f. o. b. factory | 32-33 |
| **ANTIMONY—Duty 10%.** | |
| Cookson's, Hallet's or American | Nominal |
| Chinese, Japanese, Wah Chang WCC, brand spot | 7.50 |
| **NICKEL—Duty, Ingot, 10% ad valorem. Sheet, strip, strip and wire, 20%.** | |
| Ingot | 43.00 |
| Shot | 43.00 |
| Electrolytic | 45.00 |
| **MANGANESE METAL** | Nominal |
| **MAGNESIUM METAL—Duty 20% ad valorem (100 lb. lots)** | $1.60-$1.85 |
| **BISMUTH—Duty free** | $2.70-$3.00 |
| **CADMIUM—Duty free** Nominal | $1.40 |
| **CHROMIUM METAL—Duty free** | Nominal |
| **COBALT—97% pure** | $2.50-$3.00 |
| **QUICKSILVER—Duty 10% per flask of 75 pounds** | $90 |
| **PLATINUM—Duty free, per ounce** | $85-90 |
| **SILVER—Government assay—Duty free, per ounce** | .99½ |
| **GOLD—Duty free, per ounce** | $20.67 |

# Metal Prices, July 6, 1920

## INGOT METALS

| | | | | | |
|---|---|---|---|---|---|
| Silicon Copper, 10% | according | to | quantity | 49 | to55 |
| Silicon Copper, 20% | " | " | " | 36 | to40 |
| Phosphor Copper, guaranteed 15% | " | " | " | 25 | to33 |
| Phosphor Copper, guaranteed 10% | " | " | " | 24 | to31 |
| Manganese Copper, 30% | " | " | " | 65 | to72 |
| Phosphor Tin, guarantee 5% | " | " | " | 75 | to78 |
| Phosphor Tin, no guarantee | " | " | " | 55 | to65 |
| Brass Ingot, Yellow | " | " | " | 14 | to16 |
| Brass, Ingot, Red | " | " | " | 18 | to21 |
| Bronze Ingot | " | " | " | 18½ | to21½ |
| Parsons Manganese Bronze Ingots | " | " | " | 22½ | to24 |
| Manganese Bronze Castings | " | " | " | 32 | to42 |
| Manganese Bronze Ingots | " | " | " | 19 | to23 |
| Manganese Bronze Forgings | " | " | " | 30 | to40 |
| Phosphor Bronze | " | " | " | 24 | to30 |
| Casting Aluminum Alloys | " | " | " | 32 | to34 |
| Monel Metal | " | " | " | 38 | to.. |

## OLD METALS

| Buying Prices. | | Selling Prices. |
|---|---|---|
| 15 to15½ | Heavy Cut Copper | 16½to17 |
| 14¾to15 | Copper Wire | 16 to16½ |
| 13 to13½ | Light Copper | 15 to15½ |
| 14½to15 | Heavy Machine Comp | 16½to17 |
| 10½to11 | Heavy Brass | 12½to13 |
| 8 to 8½ | Light Brass | 10 to10½ |
| 9 to 9½ | No. 1 Yellow Brass Turnings | 11 to11½ |
| 14 to14½ | No. 1 Comp. Turnings | 16 to16½ |
| 4.25 | Heavy Lead | 4.90 |
| 4.25 | Zinc Scrap | 5.00 |
| 10 to13 | Scrap Aluminum Turnings | 11 to14 |
| 21 to23 | Scrap Aluminum, cast alloyed | 23.50to25 |
| 24.00 | Scrap Aluminum, sheet (new) | 26.50 |
| 36.00 | No. 1 Pewter | 40.00 |
| 18.00 | Old Nickel anodes | 20.00 |
| 26 to28 | Old Nickel | 30 to32 |

## BRASS MATERIAL—MILL SHIPMENTS

In effect January 7, 1920.

To customers who buy 5,000 lbs. or more in one order.

| | Net base per lb. | | |
|---|---|---|---|
| | High Brass. | Low Brass. | Bronze. |
| Sheet | $0.25¼ | $0.27¼ | $0.29 |
| Wire | .25¼ | .27¼ | .29 |
| Rod | .23¾ | .28 | .30 |
| Brazed tubing | .37 | .. | .41¾ |
| Open seam tubing | .37 | .. | .41¾ |
| Angles and channels | .38 | .. | .42¾ |

To customers who buy less than 5,000 lbs. in one order.

| | Net base per lb. | | |
|---|---|---|---|
| | High Brass. | Low Brass. | Bronze. |
| Sheet | $0.26½ | $0.28½ | $0.30¼ |
| Wire | .26½ | .28½ | .30¼ |
| Rod | .25 | .29¼ | .31¼ |
| Brazed tubing | .38¼ | .. | .43 |
| Open seam tubing | .38¼ | .. | .43 |
| Angles and channels | .39¼ | .. | .44 |

## SEAMLESS TUBING

Brass, 30½c. to 32½c. per lb. base.

Copper, 32c. to 34c. per lb. base.

## TOBIN BRONZE AND MUNTZ METAL

| | | |
|---|---|---|
| Tobin Bronze Rod | 29½c. | net base |
| Muntz or Yellow Metal Sheating (14"x48") | 25¾c. | " " |
| Muntz or Yellow Rectangular Sheets other than Sheathing | 26¼c. | " " |
| Muntz or Yellow Metal Rod | 23¼c. | " " |

Above are for 100 lbs. or more in one order.

## COPPER SHEET

| | |
|---|---|
| Mill shipments (hot rolled) | 29½c. net base |
| From stock | 32½c.-35c. net base |

## BARE COPPER WIRE—CARLOAD LOTS

22¾c. to 23¼c. per lb. base.

## SOLDERING COPPERS

| | |
|---|---|
| 300 lbs. and over in one order | 31½c. per lb. base |
| 100 lbs. to 300 lbs. in one order | 32½c. " " " |

## ZINC SHEET

Duty, sheet, 15%. Cents per lb

Carload lots, standard sizes and gauges, at mill, 12½c. basis less 8 per cent.

| | |
|---|---|
| Casks, jobbers' prices | 14c. |
| Open casks, jobbers' prices | 14½c |

## ALUMINUM SHEET AND ROD

Sheet Aluminum, base price, 54c. per lb. Coils 50c. per lb.

ROD.

B. & S. Gauge.

¾" to 1" Advancing by 32nds
1" to 2⅝" " " 16ths } 98% rolled, 43.10 cents per lb
2⅝" to 3½" " " 8ths

⅜" to ¾". 98% rolled and drawn.....48.80 cents per lb

## BLOCK TIN SHEET AND BRITANNIA METAL

Block Tin Sheet—18" wide or less. No. 26 B. & S. Gauge or thicker, 100 lbs. or more, 10c. over Pig Tin. 40 to 100 lbs., 15c. over 25 to 50 lbs., 17c. over, less than 25 lbs., 25c. over.

No. 1 Britannia—18" wide or less. No. 26 B. & S. Gauge or thicker, 500 lbs. or over, 5c. over N. Y. tin price; 100 lbs. or more, 8c. over Pig Tin. 50 to 100 lbs., 12c. over, 25 to 50 lbs., 15c. over, less than 25 lbs., 25c. over.

Above prices f. o. b. mills.

Prices on wider or thinner metal on request.

## MONEL METAL

| | |
|---|---|
| Shot | 35 |
| Blocks | 35 |
| Sheet Bars | 40 |
| Hot Rolled Rods (base) | 40 |
| Cold Drawn Rods (base) | 56 |
| Hot Rolled Sheets (base) | 55 |

**Lead Foil**—base price—figured on base price of lead at the time.

**Platers' metal,** so called, is very thin metal not made by the larger mills and for which prices are quoted on application to the manufacturer.

## SILVER SHEET

Rolled silver anodes .999 fine are quoted at from .95c. to .97c. per Troy ounce, depending upon quantity.

Rolled sterling silver, 91c. to 94c.

## NICKEL ANODES

| | | |
|---|---|---|
| 85 to 87% purity | .55c. | per lb. |
| 90 to 92% " | .57½c. | per lb. |
| 95 to 97% " | .60c. | per lb. |

# Supply Prices, July 6, 1920

## CHEMICALS

| | | |
|---|---|---|
| Acid— | | |
| Boric (Boracic) Crystals | lb. | .25 |
| Hydrochloric (Muriatic) Tech., 20 deb., Carboys | lb. | — |
| Hydrochloric, C. P., 20 deg., Carboys | lb. | .10 |
| Hydrofluoric, 30% | lb. | .40 |
| Nitric, 36 deg. Carboys | 100 lb. | 8.28 |
| Nitric, 42 deg. Carboys | 100 lb. | 8.90 |
| Sulphuric, 66 deg., Carboys | lb. | .04½ |
| Alcohol— | | |
| Denatured | gal. | 1.50 |
| Alum— | | |
| Lump, Barrels | lb. | .05½ |
| Powdered, Barrels | lb. | .07 |
| Aluminum sulphate, commercial tech | lb. | .15 |
| Aluminum chloride solution | lb. | .16 |
| Ammonium— | | |
| Sulphate, tech., Barrels | lb. | .08½ |
| Sulphocyanide | lb. | 1.50 |
| Argols, white, see Cream of Tartar | lb. | .80 |
| Arsenic, white, Kegs | lb. | .18 |
| Asphaltum | lb. | .35 |
| Benzol, pure | gal. | .75 |
| Blue Vitriol, see Copper Sulphate. | | |
| Borax Crystals (Sodium Biborate), Barrels | lb. | .10½ |
| Calcium Carbonate (Precipitated Chalk) | lb. | .15 |
| Carbon Bisulphide, Drums | lb. | .11 |
| Chrome Green | lb. | — |
| Cobalt Chloride | lb. | 2.00 |
| Copper— | | |
| Acetate | lb. | .60 |
| Carbonate, Barrels | lb. | .29 |
| Cyanide | lb. | 1.00 |
| Sulphate, Barrels | lb. | .09 |
| Copperas (Iron Sulphate, bbl.) | lb. | .04 |
| Corrosive Sublimate, see Mercury Bichloride. | | |
| Cream of Tartar, Crystals (Potassium bitartrate) | lb. | .80 |
| Crocus | lb. | .15 |
| Dextrin | lb. | .25 |
| Emery Flour | lb. | .10 |
| Flint, powdered | ton | — |
| Fluor-spar (Calcic fluoride) | ton | — |
| Fusel Oil | gal. | 6.50 |
| Gold Chloride | oz. | 14.00 |
| Gum— | | |
| Sandarac | lb. | — |
| Shellac | lb. | — |
| Iron, Sulphate, see Copperas, bbl | lb. | .04 |
| Lead Acetate (Sugar of Lead) | lb. | .25 |
| Yellow Oxide (Litharge) | lb. | .25 |
| Mercury Bichloride (Corrosive Sublimate) | lb. | 1.92 |
| Nickel— | | |
| Carbonate Dry | lb. | .80 |
| Chloride, 100 lb. lots | lb. | .65 |
| Salts, single, 100 lbs | lb. | .17 |
| Salts, double, bbl | lb. | .15½ |
| Paraffin | lb. | .25 |
| Phosphorus—Duty free, according to quality | | 40-45 |
| Potash, Caustic, Electrolytic 88-92%, fused | lb. | .32 |
| Electrolytic 70-75%, fused | lb. | .26 |
| Potassium Bichromate, Casks | lb. | .45 |
| Carbonate, 80-85% | lb. | .23 |
| Cyanide, 98-99½%, 100 lb. cases | lb. | — |
| Pumice, ground, bbls | lb. | .05 |
| Quartz, powdered | ton | — |
| Official | oz. | — |
| Rosin, bbls. | lb. | .08½ |
| Rouge, nickel, 100 lb. lots | lb. | .40 |
| Silver and Gold | lb. | .60 |
| Sal Ammoniac (Ammonium Chloride) in casks | lb. | .20 |
| Sal Soda | lb. | — |
| Silver Chloride, dry | oz. | 1.43 |
| Cyanide | oz. | — |
| Nitrate, 100 ounce lots | oz. | 66¾ |
| Soda Ash, 58%, bbls | lb. | .04 |
| Sodium— | | |
| Biborate, see Borax, bbls | lb. | .10½ |
| Bisulphite, tech. | lb. | .20 |
| Cyanide, 96 to 98%, 100 lbs | lb. | .27 |
| Hydrate (Caustic Soda) | lb. | .15 |
| Hyposulphite, 100 lb. lots | lb. | .06 |
| Nitrate, tech., bags | lb. | .08 |
| Phosphate | lb. | — |
| Silicate (Water Glass) bbls | lb. | .03 |
| Sulpho Cyanide | lb. | 1.06 |
| Soot, Calcined | lb. | — |
| Sugar of Lead, see Lead Acetate | lb. | .25 |
| Sulphur (Brimstone) bbls | lb. | .04 |
| Tin Chloride | lb. | 65 |
| Tripoli Composition | lb. | .02½ |
| Verdigris, see Copper Acetate | lb. | .60 |
| Water Glass, see Sodium Silicate, bbls | lb. | .03 |
| Wax— | | |
| Bees, white ref. bleached | lb. | — |
| Yellow | lb. | .60 |
| Whiting | lb. | .10 |
| Zinc., Carbonate, bbls. | lb. | .24 |
| Chloride, 600 lb lots | lb. | .15 |
| Cyanide | lb. | .45 |
| Sulphate, 100 lb. cases | lb. | .05 |

## COTTON BUFFS

| | | |
|---|---|---|
| Open buffs, per 100 sections (nominal). | | |
| 12 inch, 20 ply, 64/68, cloth | base, | $110.70 |
| 14 " 20 " 64/68, " | " | 137.60 |
| 12 " 20 " 84/92, " | " | 143.30 |
| 14 " 20 " 84/92, " | " | 193.05 |
| Sewed buffs, per pound | | |
| Bleached and unbleached | " | 1.05 |

## FELT WHEELS

| | | Price Per Lb. |
|---|---|---|
| White Spanish— | | |
| Diameter— 8" to over 16" | Thickness—½" and ¾" | $4.00 |
| " 8" | " 1" to 3" | 3.35 |
| " 10" to 16" | " 1" to 3" | 3.25 |
| " over 16" | " 1" to 3" | 3.35 |
| " 8" to over 16" | " over | 3.40 |
| Grey Mexican— | | |
| Diameter— 8" to over 16" | Thickness—½" and ¾" | $3.90 |
| " 8" | " 1" to 3" | 3.25 |
| " 10" to 16" | " 1" to 3" | 3.15 |
| " over 16" | " 1" to 3" | 3.25 |
| " 8" to over 16" | " over 3" | 3.30 |

Above are even diameters. Odd diameters 50c advance.